

Making Up the 3D Body:

Designing for Artistic and Serendipitous
Interaction in Modelling Digital Human
Figures

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I declare that this thesis and the work contained herein is entirely my own, except where explicitly stated otherwise in the text and documentation.

Kiona Hagen Niehaus, August 2020

ABSTRACT

Making Up the 3D Body: Designing for Artistic and Serendipitous Interaction in Modelling Digital Human Figures details the process of developing a new software tool for digital artistic exploration. Previously available software for modelling mesh-based 3D human figures restricts user output based on normative assumptions about the form that a body might take, particularly in terms of gender, race, and disability status, which are reinforced by ubiquitous use of range-limited sliders mapped to singular high-level design parameters. CreatorCustom, the software tool created during this research, is designed to foreground an exploratory and open-ended approach to modelling 3D human bodies, treating the digital body as a sculptural landscape rather than a pre-supposed form for rote technical representation. Building on the foundation of prior research into serendipity in Human-Computer Interaction, creativity support tools, 3D modelling systems for users at various levels of proficiency, and usability, among others, this research takes the form of two qualitative studies and an autoethnography of the author's artistic practice. The first study explores the practices of six queer artists working with the body and the language, materials, and actions they use in their practice, as described in interview and structured material practice sessions, which were then applied toward the design of the software tool. The second study deals with the usability, creativity support, and bodily implications and outcomes of the software tool when used by thirteen artist participants in a workshop setting. Reflecting on the relationship between affect and usability, and surprises and the unexpected in creative technology and artistic practice, these strands are brought together in an analysis and discussion of the author's experience of using the software tool to create her own artistic work dealing with gender and sexuality.

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RELATED ACTIVITES

Conference Papers and Presentations

Kiona Hagen Niehaus, “Digital Tools, Experiential Walls: Normative Limitations in 3D Human Figure Creation Tools”. *The Queer Art of Feeling: Sensation, Emotion and the Body in Queer Cultures*. Murray Edwards College, University of Cambridge, 2–3 May 2019.

Kiona Hagen Niehaus, “Gendered Limitations in 3D Human Character Creation Tools”. *Beyond the Console: Gender and Narrative Games*. London South Bank University, 9 February 2019.

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Doctoral Symposia

Kiona Hagen Niehaus, “Amateur User-Centred Software for Creative, Diverse 3D Human Avatar Design”. *DiGRA International 2017*. Melbourne, Australia, 2–6 July 2017.

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Exhibitions, Performances and Screenings

Planned Irrelevance (Video Installation, 2018). *EXTRA+TERRESTRIAL* (toured show), curated by COVEN Berlin and Ana Kovačić Iva Paska. Galerija Miroslav Kraljević, Zagreb, Croatia. 10–27 September 2019.

Dr. Self (Video Installation, 2019). *PROBAND WERDEN III*, a pop-up installation by COVEN Berlin. Hybrid Festival, Madrid, Spain. 25–27 September 2019.

Planned Irrelevance (video excerpt, 2018). *Sexuality and Porn as Queer Feminist Strategy* (film screening), curated by COVEN Berlin. Rupert Art Centre, Vilnius, Lithuania. 21 August 2019.

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Desire (short film, 2017). Femmosphere (film screening), curated by Coral Short and Lo Pecado. Schwules* Museum, Berlin, Germany. 3 June 2017.

Vision (Interactive Projection Installation, 2016–2017). THE SPRAWLS, curated by COVEN Berlin. GlogauAIR, Berlin, Germany. 24–25 March 2017.

Invited Talks

Kiona Hagen Niehaus, “Perspectives that Matter: Queer Users and Digital Creativity”. Queer STEM Day, hosted by lgbtQ+@cam, University of Cambridge. 5 July 2019.

Kiona Hagen Niehaus, “Digital 3D Human Figure Design for Creative Applications”. Possible Bodies workshop hosted by Jara Rocha and Femke Snetling, Sussex Digital Humanities Lab at the University of Sussex. 9 March 2018.

Kiona Hagen Niehaus, “Limitations and Possibilities in 3D Human Avatar Design Software”. Lovelace: Women and Non-binary in Tech series, Goldsmiths, University of London. 2 February 2018.

DOCUMENTATION AND PRACTICE WORK

Relevant selected artistic work (video): <http://research.gold.ac.uk/id/eprint/29656/>

CreatorCustom source code: <https://github.com/khniehaus/CreatorCustom/>

CreatorCustom software executable (Mac): <http://research.gold.ac.uk/id/eprint/29655/>

CHAPTER I INTRODUCTION

Digital 3D human figures are used in a wide variety of creative applications across visual and interactive media, including in animation, video games, and various forms of digital art. Yet creating detailed models of human bodies from scratch using 3D modelling tools remains a complex and difficult task; indeed, the learning curve of such software remains prohibitive for novice users (Chaudhuri et al. 2013). Effectively facilitating digital 3D modelling for various groups of non-expert users has been the focus of a high volume of research in human-computer interaction and computer graphics, but little of this research has focused specifically on modelling digital human forms. Likewise, little relevant previous research has focused on facilitating creative engagement for artist users in this domain, choosing instead to address general or especially inexperienced users in achieving limited modelling outcomes, without consideration for how the output of such engagement might be integrated into existing artistic practice. Ostensibly to allow a range of users to create customisable, unique 3D figures quickly and easily, various software products have been introduced which enable the creation of digital human figures for creative purposes.

Though each software package for modelling 3D human figures offers certain unique capabilities and affordances to the user, they also impose normative constraints on the user's design process. An affordance, in this context, may be defined as, "... an action possibility or an offering... The functions that are invocable by the user are the affordances in software" (McGrenere and Ho 2000). The kinds of bodies that users are able to create, especially with regard to the figure's labelled or implicit gender, race, and physical disability status, are constrained in both the range of modifications available to the user in program, and in the user interface design of the software itself. In particular, the ubiquitous use of sliders as the primary modification method within these software tools necessarily restricts the range of modifications that users are able to execute in that software environment, and sexist and racist categorisation and labelling can present contributing constraints for various users. These restrictions prevent users from creating non-normatively gendered figures, figures without sexualised gendered body proportions, as well as figures with a range of racial characteristics that are not stereotyped. Visible physical disability and physical characteristics associated with disability are largely or entirely absent

from such programs, and many other characteristics, particularly those associated with weight and body size, are also limited to a reduced range.

My first-hand experience of these limitations as a digital artist continues to inform this research and my commitment to the goal of this PhD research project, which is to create a software tool which expands the kinds of bodies that creative users can represent in program, and which questions the representation of the body which is dominant in comparable programs and in 3D modelled human representation more broadly. The introduction will begin with a brief discussion of the specific language used in the text as it pertains to the distinction between figures, avatars, and characters, and my choice to use ‘figures’ to refer to the output of the tools I discuss and create here. I will then address the context in which this project came about, starting from my own artistic work and moving into a broader consideration of the restrictions present in the tools and their effects on my artistic expression. Finally, I will discuss the research questions and areas which inform this project and define its aims, and finish by summarising the content of the document by chapter.

1.1 Language: Figures, Avatars, and Characters

Before discussing the context in which this project came about and the research conducted, it is important to briefly address the way in which language is used throughout this text to refer to the output of tools for creating 3D human figures. This text uses ‘figure’ as the primary term for this output; however, similar digital representations of human bodies are referred to as ‘avatars’ and ‘characters’, sometimes interchangeably. Indeed, common creative uses of digital 3D human figures, particularly video games and animated films, from which many people will likely be familiar with such forms, represent appropriate venues for referring to the forms produced by such tools as avatars or characters. Avatars, in the sense relevant to this research, are direct representations of a particular person’s consciousness in a digital venue, such as on a social media site, chat room, game, or virtual reality experience. Characters, meanwhile, are persons represented in narrative or other original creative works, often with their own backstories and personalities, belonging within the universe of the media they inhabit. While ‘figure’ may sometimes be used in a gendered sense, this usage requires contextually specific, gendered and (frequently) sexualised language in order to produce this meaning. ‘Figure’ can be used primarily to refer to a bodily shape, and is thus most relevant to this research, where the focus is on the output such standalone tools produce, and only situationally on their further usage, which this research seeks to enable but not to prescribe.

1.2 Context and Project Origins



Figure 1: Three figures from *ID-Me* (2015-2016)

I initially explored using 3D human figures in my artistic work as an aesthetic choice within a project about lesbian, bisexual, and queer women's community dynamics. The piece, which would become *ID-Me* (2015-2016) (Figure 1), used a series of life-sized digital human figures, stylised in a form similar to 'realistic' video game avatars, visualised from the shoulders up and presented at eye level for the viewer. The piece was interactive, using a heartrate sensor to sync the movement and change in the figures, as well as the background audio playback, to the viewer's pulse. The figures I created for use in the artwork were models of LBQ women I knew, created with their permission based on images of themselves they provided. The experience of modelling these figures, which I did in MakeHuman, an open source software tool, proved difficult to reconcile with my own values and with the aims of the artwork I was attempting to create. To achieve certain bodily characteristics of both cisgender and transgender women, specifically with regard to shoulders, neck, chin, and facial features, I often had to misgender them implicitly within the system. The overwhelmingly reductive nature of the racial categorisation present in the program meant that I did not use these categories for substantial modifications, but was confronted with them each time I opened the software tool, considering them in relationship to the experiences of my friends and community members, some of whom had previously shared details of their experiences with racist categorisation of their personal attributes with me in other contexts. While the figures were shown from the shoulders up, the degree of incongruity between the figure bodies and the bodies of the people I was modelling was also stark, since the modifications to create head and shoulder areas in order to match them to the images also had normalising effects on the rest of the body, or because the tool was not capable of representing the particular characteristics of that person's body, especially in terms of characteristics of size and physical disability.



Figure 2: Two examples of self-portraits used in *Assembling Desire* (2016)

Owing to the discomfort of this experience, I continued to explore ways to use and manipulate the figures produced by these tools, expanding my own skills and manipulating them in general 3D modelling environments like Maya and Blender, in order to create bespoke, highly detailed bodies with hair and other individual characteristics. This exploration led me to recreate the graphic representations of people present in *ID-Me*, one of which was a self-portrait. In exploring my own body as produced by these systems, I was especially able to be critical of the differences between those bodies and my own; I photographed my body from multiple angles, compared the models to the body I saw in the mirror and observed with my own eyes, and reckoned with the feelings that the system's representations of my body evoked for me. The image of both gendered and racially stereotypical representation the tool evoked for me in terms of my own body raised interesting questions for me in terms of the way in which such realistic aesthetics in digital 3D tend toward a kind of normative perfection in their representation. Fascinated by the contrast between these bodies and my physical body, I emphasised these qualities further by including aspects of my physical body, like tattoos, moles, and birthmarks, while accentuating the uncanny perfection of the figure body by applying texture and material attributes which caused the figures to appear glossy and inorganic. I presented the 3D mesh self-portraits and video and photographic self-documentation, as well as my own body in a handmade, touch sensitive haptic suit, in parallel in *Assembling Desire* (2016)(Figure 2), to represent lesbian desire as a 'cyborg' (Haraway 1991) subject position, with the self experienced and developed contextually and disparately in a society which seeks to normatively sexualise, stereotype, control, and erase women's desire for one another.

While these uses of existing tools for modelling 3D human figures were successful to a certain extent—and, in the case of *Assembling Desire*, inspired directly by the restrictions and modes of representation tools for creating 3D human figures present as a given—the limitations of these tools and their implications, in terms of what kinds of bodies may qualify as human and thus eligible for creation, continued to concern me. As an artist, I found the limitations of the software tools that were available to me for creating portraits and self-portraits in this format both creatively limiting and dehumanising of others and myself, in both their output and my experience of them as a user. I felt myself emotionally encountering a system that was not built to accommodate my sense of the body as a site of complex

experience and embodiment, treating the creation of digital figures as a procedural task that always abides by a normative set of rules. These systems are not built to honour the care and respect I have for those I am in community with, for their lives and their embodied experiences, for the reasons, in *ID-Me*, I was creating these portraits of them in the first place. Likewise, their visualisation of my body brought up familiar sites of discomfort, of gendered stereotyping and sexualisation, such that my approach to my artistic work necessarily had to account for this visualisation and to interrogate its consequences. To use Sara Ahmed’s apt metaphor, I encountered these tools as a wall (Ahmed 2017, 142–143), a wall which referenced and made grotesquely tangible oppressive experiences in other contexts.

While as a white cisgender lesbian with no visible physical disabilities, encountering many of these forms of representation was not painful in terms of my own experience (though some certainly were), they represent views of the body and of embodiment which represent and re-inscribe systems of power that harm all people who are subject to them, even those they place at or near the top of the particular relevant hierarchy.¹ I focus primarily on portraits and self-portraits in my art practice, and the use of 3D modelled figures has allowed me to consider a form of representation of the body not bound by the relative literalism of photography and videography, but the capabilities of prior tools for creating 3D human figures can be expanded beyond the current representational paradigm. While the tool that I created in order to remedy these issues and concerns ultimately benefited my artwork and creative practice by enabling me to move beyond these ‘walls’, the values that I brought from my artwork conceptually and technically, and from my communities, equally, influenced the tool that I created during this research. The following section will describe the specific areas of inquiry and questions addressed by this research in more detail, building on my personal and artistic context for this project.

1.3 Areas of Inquiry

This project began with three initial questions:

- How might the implementation of interaction techniques derived from artistic practice expand the creative affordances available to users in 3D human figure modelling tools, while decreasing reliance on normative categorisation?

¹ Audre Lorde describes this phenomenon succinctly, saying of patriarchal power dynamics, “Men who are afraid to feel must keep women around to do their feeling for them while dismissing us for the same supposed “inferior” capacity to feel deeply. But in this way also, men deny themselves their own essential humanity, becoming trapped in fear and dependency.” (Lorde 2007, 74)

- Which steps might be taken in designing a user interface for 3D human figure modelling software to increase usability for artist users, both creatively and without imposing normative constraints on the user's output possibilities?
- How might the range of bodies represented by 3D human figure modelling software tools be expanded to represent a broader range of human bodies and opportunities for creative expression?

This research began its inquiry with a goal to avoid normative restrictions while creating a usable system for artists and other creative practitioners who wish to use 3D human figures in their work. Following Gaver's (1991) assertion that affordances in software should mimic, where possible, actions that users are familiar with in similar, real world contexts, this research focused initially on translating principles of the experienced physicality of art practice across media to a digital environment. This was prioritised in order to treat modelling digital bodies as a creative endeavour, in which many possibilities must exist to realise this goal, rather than a simple parametric modelling task, where the outcome was presupposed by a particular normative form. I interviewed six artists about their creative processes, the ways in which they interact with materials during their practice, the language they use, and the actions that they take while creating art, in order to both address a gap in current research literature related to artistic practice, and to inform the software design process.

Based on the data collected in these interviews, I developed CreatorCustom, a system which allows the user to drag directly on the figure model's body, manipulating active areas at will and without range-limitation, depending upon which tool function within the software they use, resulting in both representational and abstract human forms. This move toward abstraction was influenced by the realisation that preventing abstraction, however well-intentioned, would necessarily encourage a normative form, since doing so would mean restricting which areas might be manipulated by the user in relationship to one another. These functions within the software tool were developed, categorised, and labelled according to their similarity with popular actions across media taken from the artist interviews, and the language used by the interviewees to describe those actions. Additionally, a randomiser mechanism was introduced in order to produce a varied selection of possible starting points for modelling to the user, tending toward characteristics which other programs have shied away from.

This prototyped software tool was user tested with small groups of 13 artist participants in total from various practices and backgrounds in workshop sessions in which participants used the tool to create figures based on their own ideas. All participants were interviewed in their groups after working with the tool, and this data was analysed and discussed according to the relationship between participants' described perceptions of materiality in relationship to the functions and labels present in the software tool, the ability of the tool to suggest serendipitous results to users, and the role of tools for creative and artistic applications. I then embarked on a four month period of using the tool in my own artistic

work, keeping a diary of my use of the tool after completing each session and reflecting on what I had made and my experience of making it. These entries are discussed in terms of my perception of my minority status and its relationship to my perception of my role as the developer of the tool, the role of affect in usability and its impact on my user experience of previous tools and the tool I developed, and the form of the figure body and its advancement through suggestion of the ideas relevant to my artistic work. I then describe particular figures that I produced using the tool, formally and in terms of their expressive and conceptual qualities.

The process of this research produced the following contributions:

1. Identification of gaps in existing creative software pipelines for 3D modelling of human figures.
2. New research into the physical, chronological, and embodied practices of artists working with the human body, which provides an embodied, experiential perspective on their art practice and process. This work yields insight into artists' processes, decision-making, and experiences, and reveals commonalities in the language different artists use in practice to describe their actions. This knowledge suggests new directions for the design of software tools that support creative work with and concerning the body.
3. A new software tool which supports an exploratory approach to 3D modelling human figures, focused on expression rather than rote technical precision.
4. An understanding of how tools such as this can support artistic work, specifically:
 - 4.1 Evidence from a user study that such a software tool may provide useful, interesting, and serendipitous results for artist users who are able to contextualise the interactions and results they achieve in terms of their own creative practice, experiences, or interests in either the material of 3D modelling or the form the tool produces.
 - 4.2 Evidence from a user study that a software tool may disrupt the normative form of the human body for users through suggestion of underrepresented characteristics, but that such disruption is also dependent on the user's ability to contextualise and find meaning in the forms the tool creates.
 - 4.3 More information about the usefulness, advantages, and limitations that arise when such a software tool attempts to provide continuity between its terminology and affordances, and real-world artistic practices.

- 4.4 A discussion of how the software tool I created facilitated a disruption in my own artistic work, specifically leading to a formal, representational, and experiential shift of my practice and the human figures I create.

1.4 Document Structure

This chapter has addressed the origins and context of the project within my own artistic practice, and summarised its contributions. The remainder of this document addresses the research and practice elements of this project; as appropriate, both the prototyped software tool, CreatorCustom, and the artwork produced while using the software tool constitute the required practice-based elements of this research. Chapter 2 contains the literature review relevant to this research, addressing the human body in social and cultural context, the design choices and limitations of currently available tools for modelling 3D human figures, and relevant academic research related to 3D modelling systems for inexperienced users, creativity support tools, direct manipulation interaction design principles, and systems for providing the user with serendipitous discovery, within and outside of artistic contexts. Chapter 3 details the artist interview series, describing the development of the questions and study design, the participants' responses, and a discussion of their feedback related to their processes, decision-making, interaction with materials, and the role of the body in their work, as well as the language they used to describe their actions during the material manipulation portion of the interview.

Chapter 4 discusses the process of design and development of the software tool, including the approach to the figure body, the randomiser, and the interaction design and user experience decisions that contributed to the development of the direct manipulation system which was ultimately implemented. Chapter 5 addresses the workshop study conducted using the prototyped software tool, their design, outcomes, and discussion related to user participant perception of materiality in the software tool, the tool's serendipitous qualities, and the role of digital tools more broadly. Chapter 6 concerns my use of the tool in my own artistic practice, contextualising my artwork produced during the course of this research, then examining and discussing the autoethnographic diary I kept of my practice over a four-month period. This discussion addresses the diary in terms of my perception of my developer role, the role of affect in usability, and the sculptural body and its impact on my work, with the chapter finishing by presenting an overview of the artistic work I produced using the tool. Chapter 7 finishes by discussing the contributions of this research related to materials and materiality, the role of tools for creative and serendipitous purposes, and the body's non-normative, sculptural, abstracted form.

Chapter II LITERATURE REVIEW

3D human figures are used in a range of media, from animation to video games to various forms of static, time-based, and interactive digital art. While the level of stylization, realism, and detail of such figures may vary by application, creating digital human bodies is a complex task to execute using 3D modelling software (such as open source tool Blender and Autodesk's Maya, among others), even for highly skilled practitioners (Funkhouser et al. 2004). Various software packages exist in order to facilitate access to a variety of customizable figures, poses, and animation tools, without requiring artists and other creative practitioners to attain expert level digital 3D modelling skills so as to use such human figures in their work. These software systems are indeed capable of creating a broad range of digital human bodies effectively, but the kinds of bodies that the user is able to create in program are limited based on normative ideas about what form a human body might take.

This chapter discusses the background for this research project, drawing primarily on the body's role as the site of embodiment and as a politicized object, even in digital contexts. Having thus situated the discussion, currently available software options (most notably MakeHuman, SmithMicro's Poser, and DAZ 3D) will be examined in terms of their modelling capabilities and possibilities, as well as their user interfaces and interaction design. Since many of the normative constraints present in the design and affordances of these software systems are also present in video game character creation interfaces (CCIs), examples of CCIs will be discussed, including several notable innovations in this domain. Academic research toward facilitating digital 3D modelling by novice users will also be discussed, as will strategies and research related to designing creativity support tools, digital sculpting tools, direct manipulation interfaces for artistic and creative design, serendipity in human-computer interaction, and digital materiality. This chapter will finish with an overview of the aims and methodology for the project.

2.1 The Body in Context: Normativity, Power, and Subjectivity

This research focuses primarily on modelling realistic digital 3D human forms. As such, it is important to situate this project in context of relevant theoretical scholarship about the regimes of social power governing the body, and how these dynamics translate to digital environments. This section is grounded in a Foucauldian theoretical framework of power, in which regimes of power are produced by social discourse and also reproduce themselves by upholding those discourses, which become normative and institutionalized through the repetition and codification of discursive elements into law, science, and technology (Foucault 1978, 81–85). Drawing on the writings of Butler, Shildrick, Ahmed, Garland-Thomsom, and Wekker, among others, this theoretical foundation will be expanded and specified to discuss the processes which have produced normative subjectivities as arising from bodies which are understood to be white, male, heterosexual, cisgender, and not disabled. While digital embodiment offers its own significant possibilities and opportunities for exploration, this section will finish by addressing the continuation of these norms into digital environments.

The normative conception of two separate genders arising from clearly sexed bodies with necessarily corresponding chromosomal makeup is culturally pervasive to the point of being an assumed scientific fact; this assumption provides a justification for perpetuating the conflation of scientific and cultural ideas of sex and gender. Butler describes the sexed body as materializing a regulatory norm wherein a body must have a binary sex to be recognized as human, and that this sex is “treated as a given [which] presupposes and consolidates the conditions of its own emergence” (Butler 1993, xix). Human bodies are assumed to have one of two binary sexes by nature of their material existence, and a sexed body becomes a prerequisite for embodied subjectivity, in a constant process of assumption and reification of this norm. “‘Sex’ is thus, not simply what one has, or a static description of what one is: it will be one of the norms by which the ‘one’ becomes viable at all, that which qualifies a body for life within the domain of cultural intelligibility” (Ibid, xii). While most bodies may not conform perfectly to the norm as such, adherence emerges from and is dictated by the conditional interaction of bodies with state and institutional apparatuses, which reinforce and validate their categorization (Foucault 1978, 37–40).

However, biologist Joan Roughgarden, among other prominent experts, problematizes the conflation of the biological definitions of “male” (making small gametes) and “female” (making large gametes), which are relevant categories to describe sexual reproduction across species, with specific primary or secondary anatomical features and/or social categories, especially among humans (Roughgarden 2013, 147–149). She cites examples which remove any scientific basis for anatomical “sexual” differences as fixed or binary across species, or that gender stereotypes specific to human societies are “naturally” replicated among other animals, though of course, scientific language and structure has also been shown to social biases as well (Martin 1999). “Instead of taking responsibility for who counts socially

as a man or a woman, people turn to science... However, the definition of social categories rests with society, not science, and social categories can't be made to coincide with biological categories except by fiat" (Roughgarden 2013, 148).

Of course, this exclusive binary of sexed human bodies is directly contradicted by the embodied existence of millions of people whose assigned sex at birth, chromosomal makeup, gamete production, genital and secondary sex characteristics, and gender presentation do not align at birth or over the course of their lives as the cisgender archetype dictates, including cisgender people. Various individuals' bodies may present visually, chromosomally, and hormonally from birth on into puberty and adulthood in ways that are variable within and beyond the sides of the expected binary, though it is still common for variance in genital appearance at birth among intersex infants to be forcibly surgically altered, sometimes without parental knowledge (and certainly without the infant's consent). Chase refers aptly to these coercive surgical procedures as "...the attempted production of normatively sexed bodies and gendered subjects through constitutive acts of violence" (Chase 1998, 189). This is not to say surgical alteration of the body is necessarily violent, and indeed, many people may engage in voluntary surgical procedures related to altering or augmenting gendered aspects of bodily appearance. However, coercive policies mandating certain types of sexual reassignment surgeries (which often necessarily involve reproductive sterilization) are the conditions by which transgender people in particular are forced to access changes to government paperwork and social services, especially for vulnerable and criminalized populations without easy access to alternatives (prison inmates, homeless people, and sex workers, among others) (Cárdenas 2016, 55; Spade 2011, 7–10).

The conflation of scientific and social concepts of sex and sexed bodies is a foundational tenet of a larger system in which morality, politics, and social anxieties and prejudices are deployed under the guise of scientific legitimacy to regulate the sexuality and behaviours of poor and disenfranchised minority 'others' (Foucault 1978, 54–55). Separating licit, procreative sexuality from illicit acts, defining 'sex' as heterosexual intercourse at the exclusion of all other pleasurable acts (and even criminalizing some as 'sodomy'), in concert with laws against interracial marriages and the promotion of sterilization for colonised, racialised, classed, and disabled populations, reveal an intricate historical structure of institutional control over groups of people, continuing through the present (Ibid, 102–106; Spade 2011, 137–140). Prioritizing sexual behaviour to serve a patriarchal ethic intent on controlling appropriate partners and transfer of property based on biased scientific ideas about desirable reproduction necessitates two exclusive, oppositional, and unequal genders which relate to one another primarily through sexuality in order to facilitate the continuation of this system. This structure materializes sexed bodies and social categories of gender, intersected and influenced variably by race, ability, sexuality, and class, as stable and directly correspondent, natural, and indeed, scientifically correct, in order to maintain control over which bodies are licit, over the kinds of bodies that can even be said to 'exist' at all (Butler 1993, 9–13).

To say that sexed bodies within this structure are binary is not to say that bodies codified and recognized within this binary are equal, though they are intelligible. Butler explains the limits of which bodies can embody Western philosophical subjectivity, saying, “This figuration of masculine reason as disembodied body is one whose imaginary morphology is crafted through the exclusion of other possible bodies” (Butler 1993, 21). In this dynamic, defining that which is outside patriarchal masculine embodiment, and therefore, subjectivity, as ‘other’ or absence, means that the implicitly cisgender, heterosexual, white masculine borders of the normative Subject are not as stable as this binary might have them appear. Rather, they require constant reification of the normative subjectivity through the reproduction and materialization of this unequal, oppositional binary reinforced by heteronormative sexuality (Ibid, 31-33). This normative subject is defined both by a heteronormative relationship to a feminine ‘other’, and according to the borders of the sexed body, but along that of whiteness as well.

In this regard, Ahmed writes: “Universal = white men. In making this equation, we are showing how a universal not only universalizes *from* particular bodies, but is an invitation to those very bodies, providing a space in which they can be accommodated” (Ahmed 2017, 111). The normalizing universality of white maleness, and white cisgender male bodies, reproduces its own normativity through making space for more normative bodies, self-perpetuating a system through accommodating only those who are desirable. This dynamic is reproduced in digital space, where white and light-skinned male bodies are the norm as playable characters in games and other forms of digital media (Mou and Peng 2009). Legacies of colonialism, of slavery, enforced separation and segregation, and historical and ongoing legal, medical and bureaucratic dehumanization of black and of colour communities and individuals produce a racialized Other, an absence against which to define and understand socially constructed whiteness. This othering extends to sexuality and overlaps with gender as constructed through a European colonial lens, encouraging the exoticized stereotyping and objectification of bodies of colour by projecting white patriarchal anxieties and desires onto a sexualized, distant Other excluded from white sexual purity (Wekker 2017, 94).

Ahmed discusses this enforced separation, this continual process of othering and exclusion, as a process of being made into a stranger, and how bodies of colour are coded as strangers and outliers while white bodies are average, normal, and unremarkable. “Colour becomes something that has to be explained or explained away... ‘I don’t see race’ thus translates as: I don’t see those who are not white as not white, which translates as: I don’t see not white.” (Ahmed 2017, 118–119). Having to explain the presence and history of one’s very existence, to chart the history of how one came to be in a space that is assumed not to accommodate one’s body reinforces one’s exclusion from that space. “...this is not about pretending to be something you are not but pretending not to notice that you are not what they expect... You have to pass... not by becoming white, but by minimizing the signs of difference” (Ibid, 129). The expectation of sameness, of normativity, with regard to race reproduces bodies of colour as the Other, as aberrant, both invisible and hyper-visible. To quote Wekker: “In short,

dominant views make use of asymmetrical, hierarchical binary categories that enable the dominant gender and the dominant racial group to represent themselves as neutral, nongendered, and nonracialized/ethnicized.” (Wekker 2017, 64).

A similar assumption of aberration is applied to disability and specifically to visible physical disabilities of various kinds, where one is marked as having a less than ‘whole’ body on sight. The assumption of the goodness and cohesion of this ‘whole’ body from birth is pervasive, such that deviation from this norm implies that a ‘wrong’, that a violent incident or accident of some kind has occurred to produce the existence of a body outside of the norm, even at the cellular level, and this normative, stable body affects the construction of the social and physical landscape. Sobchack describes this phenomenon in terms of prosthetic limbs, stating that, “...this corporeal wholeness tends to be constituted in purely *objective* and *visible* terms; body ‘parts’ are seen (from an ‘observer’s’ point of view) as missing or limited and some ‘thing’ other (or some ‘other’ thing) is substituted or added on to take their place.” (2004, 210) This normative belief in ‘wholeness’ can be broadly described in the approach of a medical system which assumes, “...that health is some kind of given: a normative state which can be restored by defeating the abnormality of disease” (Shildrick 1997, 17). Given the likelihood of experiencing at least a temporary form of disability at some point, whether congenital or situationally acquired, and the existence of invisible or conditionally visible disabilities, the distinction between able and disabled bodies is similarly both socially constructed and opaque.

However, the opacity of division between abled and disabled bodies cannot obscure that these distinctions are made and enforced legally, medically, socially, and physically on an ongoing, experiential basis. Hickey-Moody discusses these distinctions in terms of the medical classification of intellectual disabilities according to perceived limitations, stating, “Broadly applicable definitions of disability ... have pragmatic utility. They also constitute opinions that significantly shape the ways in which people with intellectual disabilities can be known.” (Hickey-Moody 2009, 28) Addressing physical disability and embodiment, Garland-Thomson writes, “The dynamism between body and world that produces fits or misfits at the spatial and temporal points of encounter between dynamic but relatively stable bodies and environments. The built and arranged space through which we navigate our lives tends to offer fits to majority bodies and to create misfits with minority forms of embodiment, such as people with disabilities.” (Garland-Thomson 2014) Experiencing such ‘misfits’, compounded by presuppositions about the naturalness of a particular ‘fit’ within an environment or structure, may be said to produce conditions by which ability itself is constructed. To quote Shildrick, “...it is not simply that some exceptional — paradigmatically disabled — bodies fall short of the normative standard, but that embodiment in general is disordered and uncertain.” (Shildrick 2009, 173)

Embodiment, particularly minority and othered embodiment, remains with users even when they enter digital spaces, since, “...Subjectivity cannot be said to be transcendent but is marked by the continual

process of the body.” (Shildrick 1997, 44) Likewise, Ahmed describes the feeling of comfort in normativity as a ‘fit’ between the normative space and the body, lessening one’s perception of one’s body as separate from their surroundings in a space that has already conformed to their shape; in contrast, the ‘misfit’ of occupying a space which does not fit is experienced as discomfort and restriction, a heightened awareness of the body’s separateness. As Ahmed articulates, “Normativity is comfortable for those who can inhabit it” (Ahmed 2014, 147). Though people do not carry their bodies physically into these virtual spaces, they carry experiences and perceptions mediated by their embodied physical existence, and though embodiment loses its tangible, immediate form, the same forces are reconfigured and shaped by these environments, especially when they perpetuate the same power structures found elsewhere in society. Muñoz describes the “lure of the universal” white male subjectivity as ‘seductive’, understood as uncomplicated by the “affective particularity” of experiencing the world from a minority perspective (Muñoz 2006, 685). This draw toward universal subjectivity presents in ways that are similar to those one might experience in the physical world, but are also specific to their digital location. Nakamura discusses the default to assuming normativity in digital contexts in terms of race, stating that in early internet role playing chat rooms, “Race was invisible unless a player chose to inscribe it or include it in their character description, and since many did not, a kind of default whiteness reigned.” (Nakamura 2002, 33)

While technological advancements have made it possible to represent a wide variety of images and avatars digitally, Kanjere discusses the continued phenomenon of defaulting to whiteness in online spaces, acknowledging that while such spaces offer unique interactive and discursive possibilities, online discourses and communications are “...subject to the same raced, gendered and classed discursive conventions as is discourse offline.” (Kanjere 2019, 2166) However, the relative anonymity in many digital spaces is a double-edged proposition with respect to subjectivity, interaction, and engagement with other users. The availability of information, community, and space for exploration online for marginalized people can provide significant benefits, as enumerated in, for example, a 2016 study finding that internet use facilitated many different aspects of identity formation and development for the group of young gay, bisexual and queer men studied, owing in part to the fact that participants were able to engage at various levels of anonymity according to their needs and desires (Harper et al. 2016). Beyond harassment and overt violence similar to those experienced in the physical world, the stretching of embodiment and subjectivity in digital spaces has given rise to phenomena like ‘digital blackface’, used for personal and political effect (Jackson 2017; Weill 2019), and CGI influencers like startup Brud’s Lil Miquela², a virtual queer woman of colour with her own social media accounts discussing various aspects of her identity while advertising designer sportswear and other sponsored content (Boshier 2020).

² <https://www.instagram.com/lilmiquela>

Video games are also rich digital environments for examination of bias, embodiment, subjectivity, and perception. Hefner et al. describe the relationship between players and playable characters, stating that when playing video games, “... players do not observe autonomous social entities performing on screen, but they make characters perform or actually perform themselves.” (Hefner, Klimmt, and Vorderer 2007, 41) Klimt et al. also found that player identification with characters in games led to measurable shifts in players’ self-perception (Klimmt et al. 2010), and Shaw discusses embodied aspects of game play experience, from physically engaging games like *Dance Dance Revolution* to the emotional and physical interactions and responses of the player to elements within the narrative, even when not required for gameplay (Shaw 2011, 6). However, Shaw also found that the racial, gender, and sexual minority players she interviewed did not necessarily identify with playable characters who share marginalized characteristics with them, and described higher attachment to and identification with characters they created using character creation systems, even when those characters were not intended to be directly self-representational (Shaw 2011, 10–12).

Even still, there is some evidence to suggest that player identification may follow similar dynamics of prejudice when the player is not a minority. Frustration by white male players of football video game *FIFA 17* that they must play as a black character exemplifies the translation of racist dynamics to digital environments (Thomas 2016). *Rust*, a first-person survival game released in 2013, randomizes the playable character’s race and gender, and received documented criticism, complaints and backlash from white male players who felt that the inability to play as a white and/or male character hindered their ability to identify with the character that they were playing as, and to enjoy the gameplay itself (Lopez 2016). A 2018 study used *Rust* to study the effects of gender swapping on players, and found that in either case, players expressed surprise to be playing as a female character when they did, and that their reactions were similar, though more negatively inflected, when the character appeared not to be white (the participant group in this instance was majority white) (Caetano 2018).

However, as Shaw also highlights, focuses on increasing diversity in games have often emphasized diversity as something to be optionally added at the writing level, or as giving players the limited ability to create characters “like them”, rather than engaging with more complex and pluralistic views of representation in games (Shaw 2011, 12). Mou and Peng have documented both the sexual stereotyping and lack of playable women characters in games, and the relative absence of playable characters of colour outside of sports games (2009). Though games such as *Age of Empires 3* include playable characters of colour, Mukherjee discusses the colonial and orientalist narratives of history present in popular video games depicting India (Mukherjee 2016). Gewaltney and Rouner separately discuss the lack of and need for disabled characters in games, especially playable characters, and Gewaltney enumerates the possibilities not only of disabled people finding representation in such characters, but also the possibilities in terms of storytelling, experience, and education that become possible in centring disabled bodies (Gewaltney 2015; Rouner 2016). Jakobsson et al. describe the process of developing a

tool intended to help game designers reflect on the relative normativity of their character design choices along metrics of race, gender, ability, orientation, age and body type; at the same time, they were clear in pointing out that simple representation does not deal with issues of stereotyping, and that such a system cannot take the place of human expertise and evaluation of design and narrative (Jakobsson et al. 2019).

Elsewhere, research using virtual reality (VR) to explore racial biases in immersive digital environments has found that minority racial embodiment in VR may have surprising and undesirable heightening effects on racial bias and stereotypes for white participants (Groom, Bailenson, and Nass 2009), while more recent research has produced findings pointing to the reduction of implicit bias under these circumstances in a study that used only female participants (Banakou, Hanumanthu, and Slater 2016). Differences in participants' identification with gendered aspects of figure bodies in VR point to gendered differences in the participants' willingness to relate to bodies unlike their own physical bodies, wherein women were more likely to identify with gendered traits like and unlike their own (Schwind et al. 2017). Though these examples speak both to the reproduction of physical biases in digital space and the potential for change, virtual environments and the unique possibilities that they offer also extend to education in digital environments. Empathy games and other simulated experiences in VR offer new pathways for learning and immersion around complex topics like sexism, racism, and mental health (Muller, van Kessel, and Janssen 2017; Formosa et al. 2018; Felix & Paul Studios 2019). However, biases designed and coded into the software tools which facilitate the creation of 3D human figures further complicate matters.

2.2 Currently Available Software: Poser 11, DAZ 3D, and MakeHuman

Despite the relative ubiquity of digital 3D objects and characters in contemporary media, specifically in video games, animation, and film, digital 3D modelling remains a complex task with a high learning curve for untrained users. The availability of free, open source 3D modelling software options like Blender,³ video tutorials adjusted for various skill levels, and libraries of template objects for general use may provide novice users with more options than have existed previously. However, modelling unique, highly detailed human characters that are rigged for animation and use in other domains still remains a difficult task for all but the most skilled specialist users. In order to facilitate access to a wide

³ <https://www.blender.org/>

range of customizable characters for creative users, a variety of software packages have been created specifically for modelling 3D human figures with detail and precision.

It is useful to provide a quick overview of terms and concepts used in mesh-based 3D modelling, and of the functionality of mesh-based characters in digital animation software.⁴ Mesh-based modelling refers to a type of digital 3D modelling where the surface of the modelled object is made up of vertices (coordinate points in 3D space), connected by edges to form a series of uniform shapes (triangles, polygons, etc.) with a variable level of detail (an object with more polygons, for example, would tend to be smoother or more detailed than one with fewer). Textures are applied to the mesh surface in order to create shading and light reflection effects, much as textures do in the physical world, and further materials can add colour and smaller details through registration mapped application of 2D digital media, as well as other rendering effects. Vertex groups are used in modelling human figures to create 'bones' within the visible mesh, to which various parts of the figure mesh are rigged (mapped and weighted appropriately) in order to create realistic posing and animation. The figure can then be exported into animation software, where the user positions parts of the rigged figure body to correspond with various points on the timecode in order to create a desired animation, or into a game engine where various figure actions are associated with player input, among other possibilities.

Though software tools for modelling 3D human figures meet a clear need relevant to many creative applications, these tools also include a variety of normative limitations with respect to the kinds of human figures that these systems are capable of producing, and the ways in which these figures and their attributes are described within their user interfaces. This section will provide a summary of the software tools available for modelling 3D human figures, focusing primarily on standalone tools for creative applications. Several software tools will be discussed in depth, paying specific attention to the capabilities and limits of these systems for creating human figures, and the textual and design elements these tools utilize in terms of their interface and interaction designs. The capabilities and designs of these software tools will also be analysed in terms of their bodily normativity, as defined and explored in the previous section.

This review focuses primarily on Poser 11 (SmithMicro Software 2016), which is commercially licensed and costs \$350 USD; DAZ 3D (Daz Productions 2016), which is free in the basic version but includes various expansion packs of props, settings, animals, characters, and semi-humanoid creatures which cost between \$10-150 USD; and MakeHuman (MakeHuman Team 2016), which is a free and open source project. These particular tools were selected because they are each popular standalone software tools, they represent a range of price points for software that creates highly detailed, pre-rigged human figures for use in other media, and each of these three software tools is described as being useful

⁴ For more information on mesh-based 3D modelling processes, *3D Art Essentials: The Fundamentals of 3D Modelling, Texturing, and Animation* (Ami Cophine, 2011) or a similar introductory text can provide in-depth information.

specifically for creative applications. Poser 11's webpage promotes it as useful for "anything from photorealistic content to cartoon images, learning illustrations to modern art" (SmithMicro Software 2017), DAZ 3D advertises its software as useful for film and visual effects (DAZ Productions 2017), and MakeHuman is intended for use in illustration, animation, and games (MakeHuman Team 2017).

2.2.1 Poser 11

Poser 11 is the most recent iteration in the Poser software series, the first commercially available version of which was released in 1995 (SmithMicro Software 2016). SmithMicro Software also sells a more expensive Pro version of their human figure modelling software which includes additional tools for rigging, texturing, and animating figures; however, this overview covers the regular version only. Although the regular Poser 11 software includes a variety of capabilities for clothing and accessories, props, animals, and backgrounds, as well as rigging and animation, this overview will be limited in scope to discussing the affordances, capabilities, and limitations of the software for creating and modifying human figure bodies.

User Interface and Interaction Design

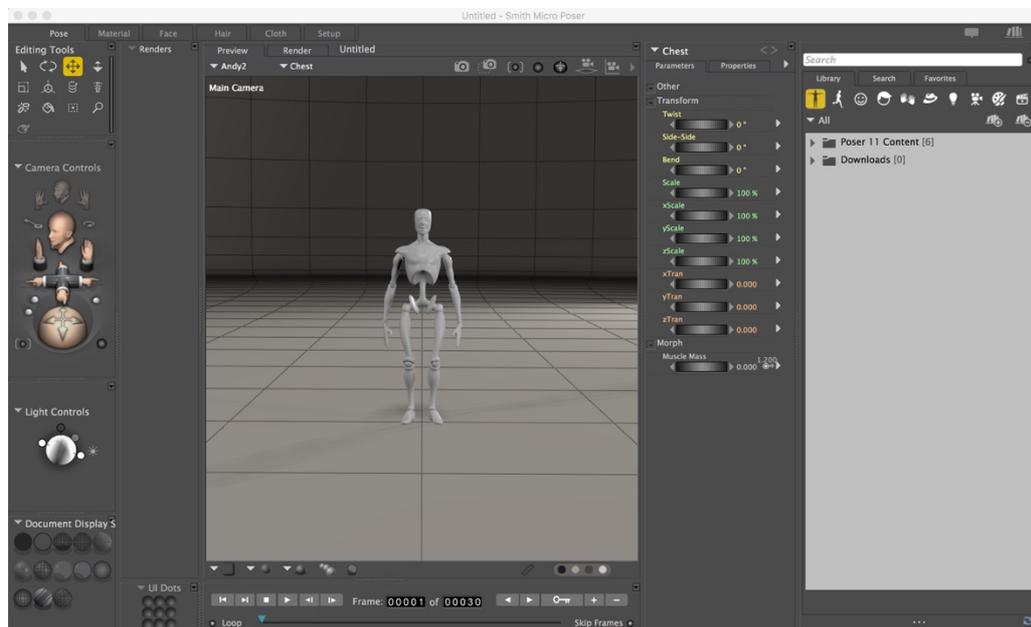


Figure 3: Poser 11's user interface

Poser 11 opens from launch into a blank grid screen with a basic jointed figure (Figure 3), with six tabs across the top of the screen for pose, material, face, hair, clothing, and setup, a left side bar with basic controls for rotating the figure and camera view and lighting, a right side bar with controls for figure

body parts, options to select various figures and environments, and a bottom panel that contains the timecode used for animation. To get started without building on the basic figure, the user must select an figure from a selection of named, pre-skinned (material and textured) character figures (for example, 'Ryan' and 'Roxie' are two), all of which are gendered, skew light-skinned, and have relatively thin bodies. The basic figure can be deleted.

The primary point of difference between Poser 11 and the other two software options discussed here is that Poser 11 uses a dial-like modified slider system in order to modify various sections of the figure body. Rather than a range-limited slider interpolating between a lowest possible value and a highest possible value, Poser's dials allow the user to expand or contract the selected section of the figure body in an unconstrained manner. Poser also includes the most detailed available modification options, with users able to modify the size and position of individual segments of fingers and toes, which allows the user a lot of control and flexibility, but which might also prove complex for a casual user.

Affordances and Limitations

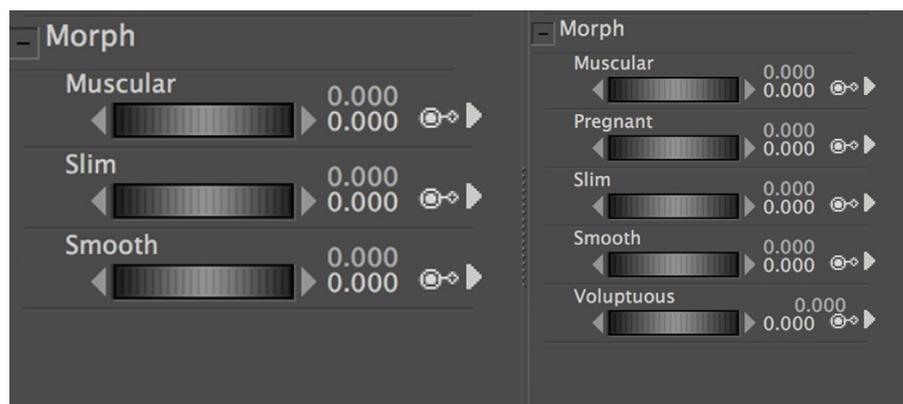


Figure 4: Torso manipulation dials in Poser 11; Above left, 'male' and, above right, 'female'

The pre-skinned, modifiable figures that the user has a choice of in Poser 11 are oppositionally gendered by default, and there is no way to change an figure's gender. The gender of the figure affects the options that are available to the user, with options like 'pregnant' only available for the mid-torso frontal section of the figure body on 'female' figures, more and detailed breast controls for female figures, and a persistent overall use of gendered language to label modification categories for figure attributes (for example, using 'voluptuous' to describe a category for a female figure while no such category appears for the male figure) (Figure 4). The genital meshes available in Poser 11 offer the clearest example of this phenomenon; while male figures all include optional genital meshes with a highly detailed, multi-segmented penis and two testicles, female figures include no genital meshes of any kind, nor is there any groin-area detailing on the figures themselves. This is both cisnormative and

patriarchally phallogentric, a graphic representation of the Freudian dichotomy of men as 'having' and women as 'lacking' the implicitly cisgender penis (Butler 1993, 50–51).

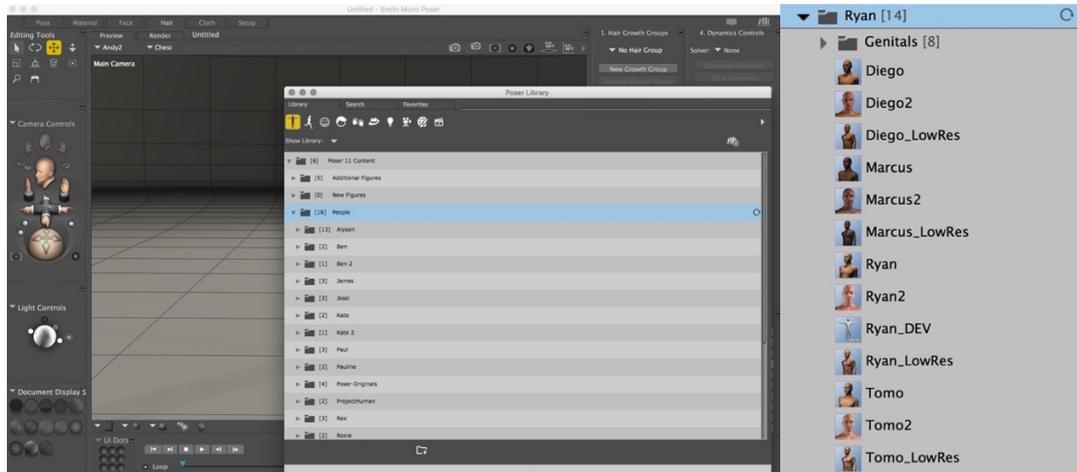


Figure 5: Above left, character choices in Poser 11; Above right, racial variations for 'Ryan'

Race in Poser 11 is highlighted primarily by figures which default to lighter material colours, and the available materials in the program do not allow the user to create a particularly dark-skinned figure without significant fine adjustment to the material and texture relationship applied to the figure. There are no dials or labels which apply to specifically racial characteristics or categories. The pre-made character names are white, Christian, and Western at a glance; however, on further investigation darker skinned and otherwise ethnically delineated figures can be found for each 'character', labelled with correspondingly 'ethnic' names, a literal default to whiteness (Figure 5). In the dial-based system, it is theoretically possible to rotate all the dials for fingers, hands, and limbs small enough to create a figure that appears to have fewer than four limbs, but such modifications can create problems when exporting. This is because resizing the body parts themselves does not change the size or appearance of the rigging skeleton, and thus the skeleton retains the bones even if the body part does not appear visible.⁵ Thus, while it is possible to achieve such results because of the lack of limitation on modifiers used within Poser 11, it is not clear that achieving non-normative results related to number of limbs, weight, and body and facial form was considered an output priority when designing this system, and promotional materials for the tool do not mention these capabilities or depict similar outputs.

⁵ While it is beyond the scope of this project for reasons of space and time, most rigging and physics engines tend to be optimised for four-limbed, able bodied animation, and may also be gendered. This may present an opportunity for future research for the author.

2.2.2 DAZ 3D

DAZ 3D is a free software package that specialises in creating fully rigged human models (Daz Productions 2016), though seemingly endless possibilities are available in terms of the paid expansion bundles of props, environments, and themed characters, including everything from werewolves to biblical characters, pirates, Vikings, and cheerleaders, among others. This software also includes tools for posing, animating, and props and backgrounds for creating scenes, but this overview will focus on the affordances and limitations of this software tool for creating human figures, discussing only the posing options as they relate to otherwise gendered aspects of the system.

User Interface and Interaction Design

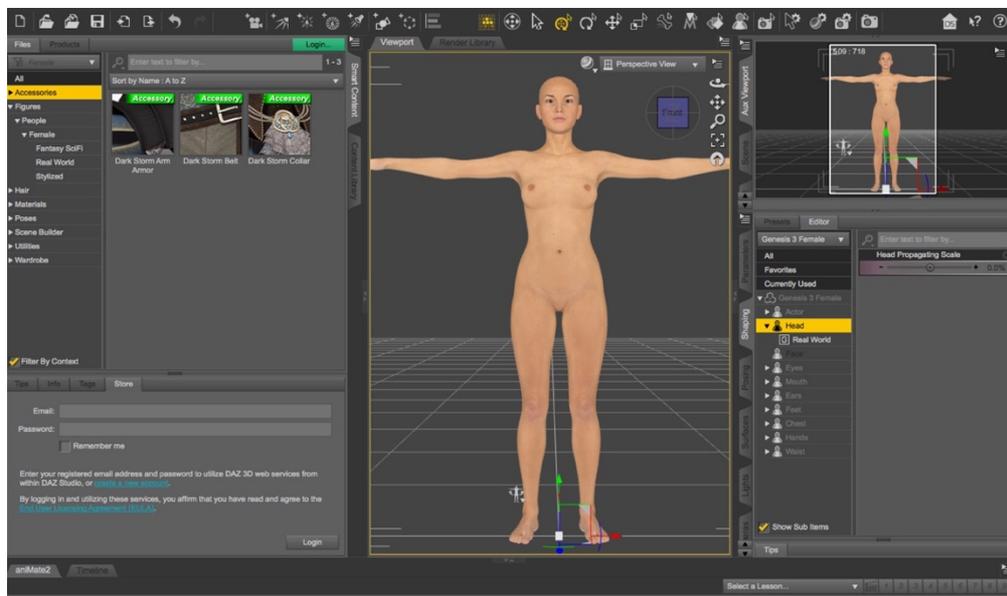


Figure 6: Daz 3D's user interface with generic 'female' figure selected

DAZ 3D opens after launch onto a blank black grid plane in the middle, with a series of buttons and tabs across the top for importing, exporting, lighting, etc., figure material options and scene selector to the left, and the area for modification sliders for the figure body to the right (Figure 6). DAZ 3D uses a clickable cube-shaped icon to rotate the camera around the figure, rather than using buttons or mouse position. The user has a choice of a male or female figure to modify, and this choice restricts the availability of posing options and modifications to the figure. The user interface is slider-based and restricted to a singular range for each body part.

Affordances and Limitations

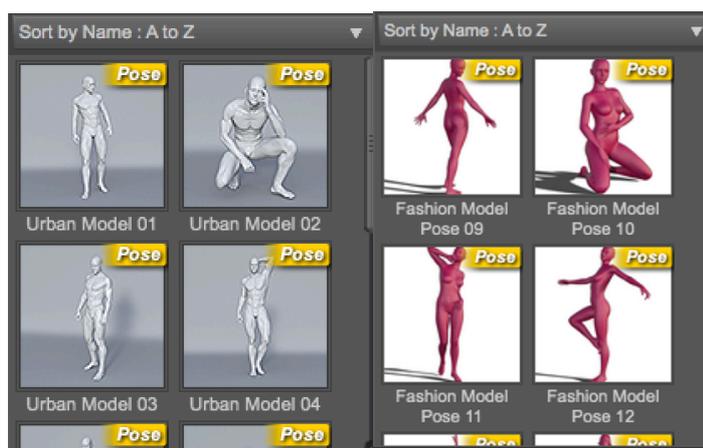


Figure 7: DAZ 3D's gendered pose options; Above left, 'male', and above right, 'female'

The basic male and female figures available in the free version of DAZ 3D are oppositionally gendered, and there is no way to change this. The gender of the figure affects the labelling of sliders for modifications to the figure; for example, an option for body type that is presented as a slider is “pear-shaped” when referring to the female figure and “portly” when referring to the male figure. Secondary sex characteristics, especially breasts, have far more available modifications, especially to the nipples and breast size, for the female figure (there are none available for the male figure), and there are no available fine detail modifications, such as for an Adam’s apple, or for genitalia at all for either figure. Genitalia for both figures is included in a paid package, and apparently includes both penis and vulva meshes. The available posing options for each figure are gendered, albeit strangely; the pose examples for the female figure are in pink and referred to as “fashion model”, while the male poses are in grey and called “urban”, despite being very similar (Figure 7). Male figures can have facial hair applied in program while female figures cannot.

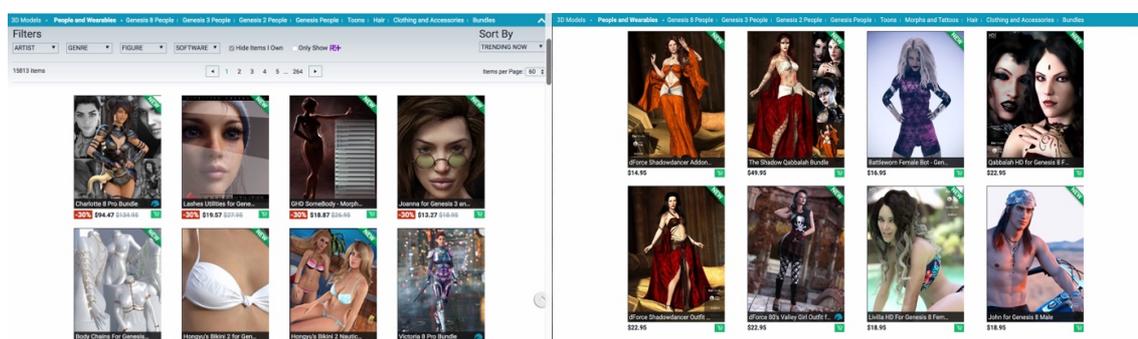


Figure 8: Screenshots of 'people and wearables' packages for sale on DAZ 3D's website (Left: 15 December 2017, Right: 12 February 2020)

The basic male and female figures in DAZ 3D are white with seemingly light coloured eye colours by default, and though it allows the choice of a limited range of material skin colours, none are darker than mid-range. The hair choices available in program are fine and seemingly European, and also gendered between the figures. There are no otherwise overt references to race within DAZ 3D's free system, and based on advertising, the paid bundles also seem to skew white, outside of bundles dedicated to creating figures of specific and homogenous racial groups (Figure 8). There is no way in program to create an figure with less than four limbs, or with a significantly disproportionate body.

2.2.3 MakeHuman

MakeHuman is a free, open source tool for creating rigged, poseable human characters (MakeHuman Team 2016). It is maintained by a community of volunteers who contribute to the project according to their capabilities in areas like 2D and 3D art, programming, and other relevant skills. MakeHuman includes basic tools for animation and for adding clothing, hair, poses, bones, and background scenes to figures; since these collections and tools are limited and outside the scope of this discussion, this overview will focus only on modifications to the figure bodies themselves.

User Interface and Interaction Design

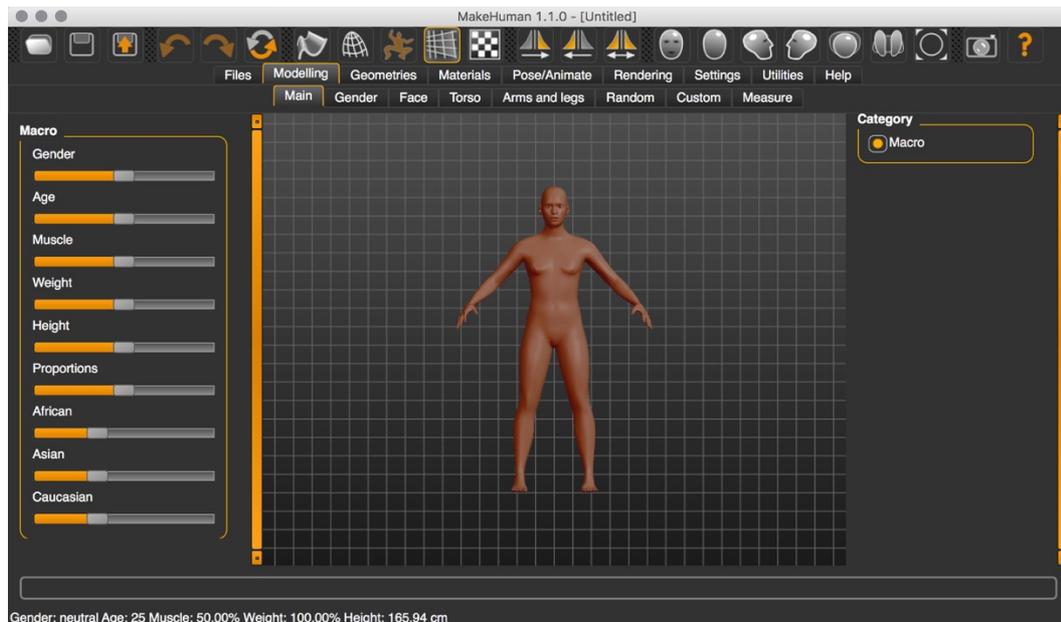


Figure 9: MakeHuman user interface with 'neutral' starting figure

MakeHuman opens onto a planar grid with a basic, unskinned figure presented in the middle (Figure 9). A toolbar across the top gives options to rotate the figure, view it as a wireframe, save, export, and to make the figure symmetrical. Tabs underneath give access to additional geometries (including hair, teeth, and genitals), materials, background, a screen for creating randomized figures, and the modelling screen that the program opens onto. The second tier of tabs, underneath the first, delineates various parts of the figure body which can be modified. The left side bar holds the sliders for modifying various parts of the figure body, while the right side allows the user to select various subcategories within the selected section of the body to be modified in order to access those sliders (for example, ‘nose’ attributes inside the ‘face’ section).

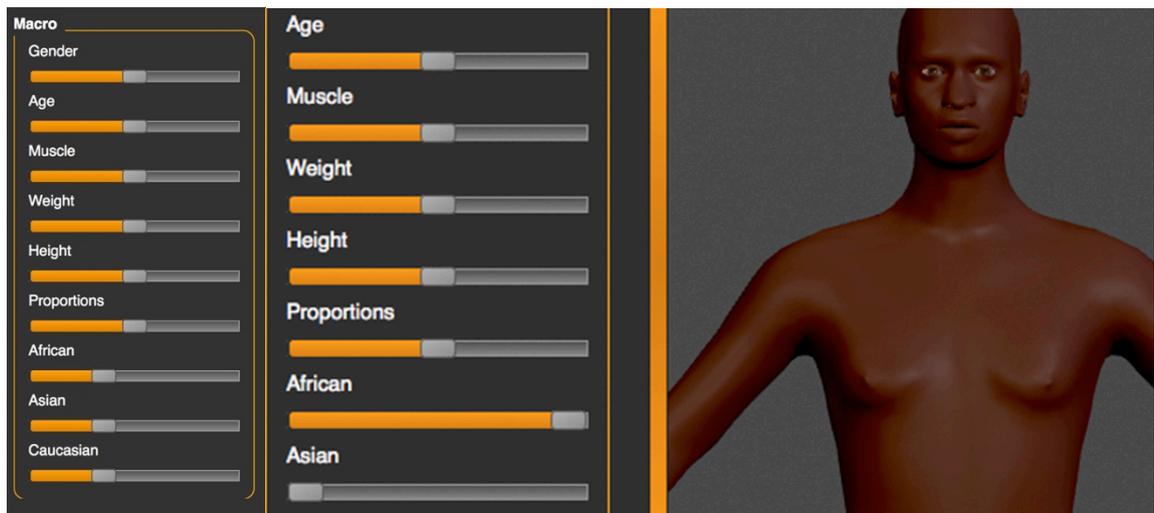


Figure 10: Above left, MakeHuman's macro manipulation sliders, including race sliders; Above right, the result of the ‘African’ slider set to 100%

Upon opening the program, all sliders are set to 50%, with the exception of the racial category sliders, which are each set to 33.33% (Figure 10, left). The interface allows the user to tier their interaction with the slider categories available by the level of detail used in a category (overall versus specific), thus offering the potential for a range of complexity for a variety of different users. The language used in the interface is variable, with some parts of the figure body referred to by medical or scientific names (referring to the ‘parietal’ side of the figure’s head, as well as ‘pectoral’ and ‘dorsi’ muscles), while others are referred to colloquially or using basic phrasing (‘Head Fat’, for example).

Affordances and Limitations

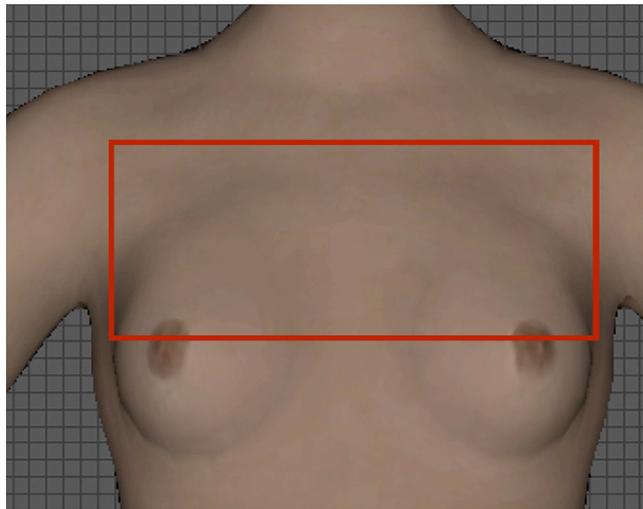


Figure 11: Figure breasts modelled in MakeHuman, exported into 3D modelling software, showing the anatomical distortion

In MakeHuman, gender is confined to a single dedicated slider, on which a user can make their figure ‘more male’ or ‘more female’ or ‘neutral’ at 50%. However, depending upon the gender percentage selection, the effects of various secondary sex sliders are more or less pronounced, with, for example, the breasts becoming smaller automatically when the slider is set to over 50%, the ‘more male’ percentages. MakeHuman also includes the most pronounced example (of the three software tools discussed here) of breasts that are modelled as stereotypically sexualised circular shapes on top of the chest wall, creating a distorted visual muscle to breast relationship more clearly reminiscent of a pronounced breast implant (Figure 11).

Since MakeHuman is open source, the user may download the source code in order to ascertain a clearer idea of how this system works. In doing so, it is clear that the MakeHuman system uses separate male and female proxy meshes (a lower quality figure mesh, used in MakeHuman to improve program speed when performing complex manipulations, which will then be translated and used to export topologies of the final, higher-quality mesh) to display modifications to the figure during the design process. Bastioni, Re, and Misra, part of the team that created MakeHuman, discuss the need to prevent users from applying “inappropriate” gendered morphing targets to figures, which assumes that user behaviour of this nature would necessarily be accidental (Bastioni, Re, and Misra 2008). That users might wish to apply morphing targets in a less binary fashion is not accounted for in the affordances provided to the user.

MakeHuman uses a uniquely reductive proportionate slider system for modifying the figure’s racial characteristics. Three sliders labelled ‘Caucasian’, ‘African’, and ‘Asian’ modify not only the figure’s applied material ‘skin’ colour, but also various attributes of the figure body that are modifiable

elsewhere in program. The ‘African’ slider, when set to 100%, widens the figure’s nose and lips, makes the figure taller, its shoulders broader, and its skin darker (Figure 10, right), while the ‘Asian’ slider at the same percentage makes the figure shorter and thinner, its eye shape thinner and angled and its lips smaller. Though these parameters might generously be described as an attempt to simplify human ethnic diversity into a succinct set of modifiers, their effect is a level of racial stereotyping and simplification on par with the scientific racism which classified people of colour as less than human in previous centuries.⁶ MakeHuman does not allow the user to modify bodies so that they have fewer than four limbs, nor does it provide any explicit affordances for creating bodies with visible physical disabilities in program, and the range of bodies allowed for is relatively narrow.

Issues of bias, normativity, and restriction in 3D human figure modelling software have been notably explored related to MakeHuman in the 2014 *Genderblending* workshop and a subsequent ongoing research project, *Possible Bodies* (Constant Association for Art and Media 2011a, 2011b). From the Possible Bodies website, the creators, Jara Rocha and Femke Snelting, describe their project as, “...concerned with genealogies of how bodies and technologies have been mutually constituted. It interrogates corpo-realities and their orientation through parametric interfaces and looks at anatomies that are computationally constrained by the requirements of mesh-modelling” (Rocha and Snelting 2017). *Genderblending*, a workshop with a group of artists, activists, and hackers held in November 2014 in Brussels, provided a framework of activities and opportunities for structured experimentation relating to representations of gender in software and digital domains, including 3D printing and modelling using MakeHuman and Blender. *Possible Bodies* as an ongoing research project includes an inventory of art, documentation, guides, and other material dealing with bodies conceptually, using technologies like 3D tracking, modelling, and scanning, as well as a series of public events, workshops and publications.

2.3 Similar Issues in Video Games

Similar issues of bodily normativity in both design and affordances also appear in 3D human character creation systems in video games. A robust discussion of this topic similar to that of the previous section is beyond the scope of this PhD research, since such an analysis must necessarily incorporate discourse about how vectors like gender, race, and disability in individual game universes factor into the affordances provided to the user when designing their character(s), and because this research focuses first and foremost on 3D human avatar design as a tool for creative practitioners to use in original

⁶ For example, Biologist Carolus Linnaeus’ *Systema Naturae* categorised humans as four separate species according to skin color in 1735.

work. Both catalogue collections of features/attributes and the type of range-limited, slider-based systems described when discussing DAZ 3D and MakeHuman are ubiquitous in games which allow players to modify their characters, and these systems and their labelling patterns present similar issues to those described previously, though systems which allow for a comparable level of detail customisation to standalone software tools are less common. However, it is useful to note several particularly customisable game character creation interfaces which provide interesting, unique, and significant affordances or methods of interaction to the user which are not found in current standalone software.

Dragon Age: II (2011) and *Dragon Age: Inquisition* (2014) each use a slider-based system similar to those noted previously in software tools; however, the options presented offer more detail in terms of facial modifications than all but the paid software tools mentioned. Even so, it can be difficult to make realistic looking characters of colour in these character creation interfaces, and although options for facial modifications are otherwise not particularly gendered, only women dwarves in *DA: Inquisition* can have beards. *Sims 4* (2014) is remarkable in that it allows the player to either pick from a series of pre-determined body parts, or directly manipulate avatar features by hovering over activated areas and dragging. The *Saints Row* franchise is known for providing a wide variety of physical detail, clothing, hair, and behavioural traits, presented in a catalogue format, which the player can apply to playable characters, many of which defy stereotypically gendered categorisation. Other notable examples include *Fallout 4* (2015), which allows for a high degree of customisation using a combination of a catalogue system of features and direct manipulation sculpting for expression and detail, and *Black Desert* (2014), which provides the player with an exceptionally wide range of available skin colours to choose from in a colour picker format.

Issues of diversity and representation in video games have been well-documented in academic research and in popular culture. That the gendered portrayals of women as avatars in mainstream games tend toward stereotypical and sexualised body proportions, and that there are a serious lack of non-white playable character avatars outside of sports video games have been familiar and important topics in games studies for some time (Williams et al. 2009; Mou and Peng 2009). Projects like *Queerly Represent Me*⁷ and *The LGBTQ Video Game Archive*⁸ are dedicated to cataloguing video games that include transgender and gender variant characters, and LGBTQ+ storylines of various kinds. While instances of playable characters with disabilities in games are virtually non-existent, particularly in major studio release games, Gewaltney describes the possibilities for challenging gameplay and empathetic response in creating a game where the player navigates a city as a wheelchair user to combat invisibility, and the

⁷ <http://queerlyrepresent.me>

⁸ <https://lgbtqgamearchive.com/>

potential for disabled heroes in gameplay has also been explored in popular media (Gewaltney 2015; Rouner 2016).

Character creation interfaces in video games have increasingly been a focus of academic research in recent years. McArthur's exploration of the affordances and user experience concerns present in character creation interfaces in a human-computer interaction context notes that prior research in the field has focused on user-avatar identification and representation (McArthur 2017). The author suggests that the affordances that a particular interface offers a player, and how that player chooses to interact with that character creation interface, might provide valuable information to support research into the relationship between players and their avatars in various games. In their presentation at the Digital Games Research Association 2017 international conference, representatives of *Queerly Represent Me*, a database for LGBT+ representation in video games, noted that while characters in many games may offer the opportunity for players to project their own experiences and perspectives onto the character that they are playing as, limitations in character creation systems can restrict otherwise diverse gameplay possibilities (A. Cole, Barker, and Zammit 2017a). They also stated that, according to an online survey of hundreds of players which they conducted in 2017, *Sims 4*'s direct manipulation character creation interface was the most preferred, based on metrics related to the diversity of body, gender, race, and size options offered in the CCI, in addition to more general concerns like graphics quality (A. Cole, Barker, and Zammit 2017b).

2.4 3D Modelling Tools for Novice Users

Producing effective, usable software tools for digital 3D modelling by novice users has been the subject of much research and inquiry in computer graphics and human-computer interaction. Where these inquiries into software and system creation have focused on modelling specific kinds of forms, these forms have been confined to animals, fantasy creatures, objects, and other non-humanoid subjects. In order to simplify complex modelling processes common in expert-level software tools, these systems focus on modelling from a limited number of appropriate pre-set parts or interchangeable mesh segments. In instances where academic and scientific research has focused on strategies for modelling human figures, this research has primarily explored technologies for scanning individual physical human bodies and replicating them accurately in digital space.

Funkhouser's foundational 2004 paper, *Modelling by Example*, addresses the difficulty of modelling complex geometric 3D objects for non-expert users by presenting a segment-based approach for digitally modelling different kinds of chairs. When using the described system, the user can select portions of different chair models from the library of available chairs, select the segment of the chair

that they wish to use in their model, and copy and paste the segment into their own chair design (Funkhouser et al. 2004, 654-656). To facilitate user accuracy when making selections, the user ‘paints’ their selection onto the model, and then copies, pastes, and joins the selection with the existing model they have created. Though the modelling database that the authors have assembled for use is certainly expansive, it would be difficult to model a broad range of human avatars effectively within such a system and such a system might easily fall into the same normative restrictions present in current software. Indeed, the authors state that this modelling method is best suited to “man-made” objects (Ibid, 652).

AttribIt presents an approach for straightforward, creative modelling of 3D objects and creatures by using descriptive adjectives to modify various attributes of a given model (Chaudhuri et al. 2013). Using the GUI of the *AttribIt* software tool, the user can manipulate a series of single axis sliders, each of which corresponds to an adjective like ‘cute’, ‘dangerous’, ‘big’, and ‘strong’, among others (Ibid, 193). These sliders modify a selected section of the model, which is also assembled based on a catalogue of available parts, in predetermined ways based on the percentage of the adjective selected (least to most dangerous, least to most cute, etc.) and in relation to adjectives used to modify other sections of the object/creature. This allows a casual user, with basic computer literacy but no expert knowledge, to create a sophisticated model in an exploratory, risk-friendly environment (Ibid). However, a descriptive adjective-based approach is less suitable for modelling human figures because words like ‘dangerous’ and ‘cute’, among others, carry racial and gendered connotations respectively, in addition to restricting user interaction to a limited range.

Another example of fixed component-based modelling is the *Shuffler* software tool (Kreavoy, Julius, and Sheffer 2007). *Shuffler* is a notable example of an easy 3D modelling for novice users in context of this project because it is one of the only examples that does model human figures using a segment-based approach, though it also models other animals as well. Kreavoy et al. discuss how their system categorises components according to class (‘head’, ‘tail’, etc.), allowing the user to view all compatible components for that section within the system and shuffle through available modifications as they are applied to the base model (Ibid, 131-132). Similarly, Ong, Ng and Yoong present a method for combining segmented parts of 3D human meshes (both full bodies and individual hands are used as examples), which, though effective, does not resize the parts when they are combined, resulting in noticeable gaps in the meshes (Ong, Ng, and Yoong 2019). Though these systems are simple and effective as a time-saving technique, possibilities for highly detailed modelling are rather limited by design, and the normative constraints that are applied within this framework (for example, the assumption that a body necessarily has four limbs) are similar to those present in more complex human avatar modelling software.

A couple of further relevant examples of previous research into creating usable systems for digital 3D modelling by amateur users which use a series of interchangeable mesh sections should also be noted here. Chaudhuri and Koltun's paper *Data-driven Suggestions for Creativity Support in 3D Modelling* discusses their approach to creating a system which presents the user with examples of component sections that could be added to their current 3D model in progress (Chaudhuri and Koltun 2010). Another project compares the user's current model stylistically and semantically to examples in its database, and shows the user a variety of compatible component options based on their relationship to these examples (Chaudhuri et al. 2011). Research suggests that exposure to multiple low-investment options and examples during the course of prototyping can strengthen design results for creative practitioners (Dow et al. 2010), and these approaches in particular offer opportunities for users to explore a variety of possibilities at speed. However, navigating a catalogue of available components large enough to represent a reasonable range of human diversity at this level of detail would prove unwieldy, and algorithmic systems, when reliant to some degree on user-contributed models (as a catalogue of fully modelled examples might likely be), run a high risk of skewing toward normative or reductive 'types' of digital bodies.

Scanning techniques for accurately creating a digital 3D model of a person's body have also been researched in this domain. Tong et al.'s approach, which uses three relatively cheap Microsoft Kinects and a bespoke alignment algorithm to create a detailed, multi-angle accurate scan of a physical human body is one such example (Tong et al. 2012). Feng, Casas, and Shapiro discuss their use of 3D scanning technology to not only create accurate digital avatars of human bodies, but also to automatically rig the avatar appropriately for use in a variety of digital environments (Feng, Casas, and Shapiro 2015). These approaches represent technical approaches and information that have the potential to be useful to a range of creative practitioners, and which might form an interesting capability of a creative 3D human avatar modelling system. Still, this modelling technique is less useful as a primary form of avatar modelling because it requires a physical representative of the body that the user would like to create, which may be both unrealistic and potentially fetishising of participants' actual bodies outside of a one-to-one portraiture context. Such scanning technologies also use a base avatar onto which morphings are performed based on scan data, and thus similar issues of bodily normativity can arise in this domain as well.

2.5 Creative Digital 3D Modelling Techniques

Outside of tools created for modelling specific objects in three-dimensional digital space, a range of research has been conducted into creative 3D modelling techniques that allow users an array of different access points and styles of user interaction. This approach centres techniques which allow the

user to create sophisticated digital 3D models without necessarily interacting with traditional 3D modelling software, and by using techniques which they may already use in creative work that they make in the physical world. These technologies include those for turning physical and digital 2D art (drawings, paintings, photographs, and the like) and physical 3D art (sculpture, ceramics, etc.) into digital 3D models, and techniques for digital sculpting using emergently available virtual reality technology.

Murakawa et al.'s *Parts, Image, and Sketch Based 3D Modelling Method* discusses their process of creating a tool which uses a database of pre-made 3D models which are morphed according to 2D images of various kinds, including freehand sketches (Murakawa et al. 2006). Intended for experts in domains outside 3D modelling, this research allows the user to dynamically constrain the registration (how the user's chosen image lines up to the 3D model), allowing for greater customisation and accuracy in modelling 3D objects from 2D images than that offered by similar previously available systems. An additional example of using 2D sketches to build accurate 3D models is presented by Xie et al.'s sketch to design system, which uses user sketches to suggest appropriate parts for assembling a 3D mesh-based object (Xie et al. 2013). Other notable examples include *3-Sweep* (Chen et al. 2013), which extracts 3D models from photographs by using three user-defined 'strokes' or lines to ascertain the x, y, and z axes of the pictured object and correctly position it in space in order to effectively create a detailed, multi-sided 3D model. Likewise, Li and Chen et al.'s method for creating 3D digital avatars from a single 2D photographic image for use in VR environments offers a simple solution to creating models of specific people, though it is not explicitly clear how their system would handle a figure with less than four limbs or with other non-normative body characteristics, since their system is based on texture-level deformations of a single standard figure mesh (Li et al. 2019). Similar approaches are present in Deng et al.'s PROME system for modelling body shape from photographs (Deng, Yang, and Zhou 2018).

Similar to technologies for scanning human bodies and assembling them accurately in 3D digital environments discussed in the previous section, low-cost technological strategies for scanning 3D objects into digital environments exist. This application is exemplified primarily by technology which enables users to scan in physical objects with the primary output intent of 3D printing, like Taubin et al.'s 2014 SIGGRAPH workshop "3D Scanning for Personal 3D Printing : Build Your Own Desktop 3D Scanner", the materials for which provide detailed information on the subject (Taubin, Moreno, and Lanman 2014). Other tools build on principles exemplified by *Kizamu* (Perry and Frisken 2001), a tool that aims to provide advances in technology for commercial modelling users by approximating 'digital clay', particularly in terms of warp and resistance, in 3D modelling tools, and Rivers et al.'s *Sculpting by Numbers*, which uses a camera and projector to scan and visually suggest (via mapped projection) dynamic modifications to a physical 3D sculpture in progress, based on a selected digital 3D target shape (like a rabbit, as is the example used by the authors) (Rivers, Adams, and Durand

2012). Peng et al.'s *Autocomplete 3D Sculpting* is a PC-based digital sculpting system for artists which offers predictive models of the user's sculpting output based on their interaction with the software, suggestions which they are free to incorporate or reject at will (Peng, Xing, and Wei 2018). These and similar approaches to converting 2D and 3D physical art objects into 3D models have potential applications for a creative, process-centred approach to modelling digital 3D human figures, allowing users to incorporate skills and practices from media into their design process.

Virtual reality (VR) technologies can also provide new opportunities for interfacing between physical practice and digital media. Jang, Wakefield and Lee provide an embodied approach to VR sculpting by augmenting gestural movement to create sculptural forms beyond those that would be possible in physical space (2017). This system allows the user to choose between various sculptural 'brushes', which provide different results, and the user retains control over the weight of the line through gestural control of the tool. Though virtual reality and/or augmented reality sculptural tools and interfaces present many exciting possibilities for digital 3D modelling, the overall cost of currently available VR systems remains prohibitive for many otherwise potential users, and the opportunities provided by such a system for 3D human avatar modelling are currently undercut by concerns about accessibility and cost for the average user.

2.6 Creativity Support and Direct Manipulation Interfaces

The slider-based user interaction methods ubiquitous in currently available software for modelling 3D human avatars may present a straightforward graphical user interface that is familiar to many users, but it also means that normative parameters can be built into these software systems by nature of their very design. Direct manipulation interfaces offer an alternative to slider-based parameters with fixed minimum and maximum values. Shneiderman describes direct manipulation interfaces as "continuous representation of the objects and actions of interest", "physical actions or presses of labelled buttons instead of complex syntax", and "rapid incremental reversible operations whose effect on the object of interest is immediately visible" (Shneiderman 1997). A simple example of direct manipulation can be found in digital design software, where the user is able to move a particular shape across the screen by dragging and dropping the shape using the cursor. In the context of 3D human avatar design software, this might refer to a system where, instead of using a slider to manipulate or make changes to an avatar, the user could choose from a variety of tools and drag or click on the responsive avatar to achieve similar results with immediate effect.

Foundational research and writing on direct manipulation interfaces and their advantages in human-computer interaction states that "... systems that best exemplify direct manipulation all give the

qualitative feeling that one is directly engaged with control of the objects—not with the programs, not with the computer, but with the semantic objects of our goals and intentions” (Hutchins, Hollan, and Norman 1985). Rather than the user using language or metaphorical design elements to communicate their desires to the system, direct manipulation interfaces afford the user the ability to intuitively execute an action and immediately see the results. Keeping the smallest possible distance between the action the user executes and the result they can see ideally means that such systems are easy for novice users to learn, and allow users to gain confidence and master necessary techniques quickly (Shneiderman 1997).

Such systems may also be conducive to a greater sense of user control and responsibility (Ibid), which might be of higher importance to users who are using software to create original artwork. Many creative software tools use a combination of direct and indirect manipulation, based on continuity between direct and less direct analogue skills and procedures. For example, Adobe Photoshop uses direct manipulation for the ‘dodge’ tool (used to make a localised section of the image lighter), where the user drags the tool repeatedly over the desired section of the image in order to achieve the intended effect. This mimics the process of dodging in a traditional darkroom setting, where the practitioner manually waves an opaque card or tool over the area they wish to make lighter. An example of a more indirect manipulation in Adobe Photoshop would be the use of sliders for colour correction; traditional darkroom printing also requires the practitioner to determine and manually adjust the colour settings on the enlarger before printing an image, and though localised colour correction is possible, in each instance it requires a precise analogue or digital ‘mask’ of the intended area to protect the rest of the image.

A typical example of a direct manipulation is that of dragging an onscreen shape in order to change its size, shape, or orientation (Hutchins, Hollan, and Norman 1985). Indeed, graphics tasks are in many ways particularly well-suited to direct manipulation interactions, since actions like dragging a section of a 3D model or holding the mouse down and moving it over the desired section of an image mimic the ways in which users would lengthen a section of a physical sculpture or dodge to lighten or burn to darken desired sections of an image in a darkroom setting, respectively (Gaver 1991). The rapid feedback and iterative possibilities of such a system also lends itself well to creative work, where there is evidence that such qualities improve the outcomes of prototyping and design processes (Mueller et al. 2015; Dow et al. 2010). Though menu selection and form fill-in interaction methods, for example, might be useful for running essential, repetitive functions or entering precise values, respectively, applying direct manipulation interaction design principles within methodologies for creating and evaluating creativity support tools provides useful strategies for developing interaction for an effective, usable tool for creative 3D modelling.

2.7 Developing Creativity Support Tools

In currently available software programs for modelling 3D human avatars, avatar modelling is treated as a procedural exercise with a constrained, normative outcome. While the outcomes of such a system may meet the needs of some users, the creative applications and uses of digital 3D avatars are at odds with the interface with which the user is meant to create them. Creativity support tools should be designed with a “low threshold, high ceiling, and wide walls” — that is, a low threshold for beginners, a high ceiling for expert users, and enough room in the middle for a wide range of exploration (M. Resnick et al. 2005). Based on this directive, one might surmise that currently available software systems for modelling 3D human avatars indeed have a low threshold, since the slider-based interface is common and likely familiar to users from other software tools, but the ceiling and walls of these tools are middling at best, providing little opportunity for expert growth within the tools themselves and limited exploration confined to a constrained user interface design. The design elements that simplify these software tools so as to produce a low-threshold, limited system also have the effect of simplifying the process of avatar modelling to produce tools which reproduce normative bodily ideals. Though it would be too great an assumption to assume that the designers involved in making these tools built them with the conscious intention of enforcing bodily normativity, pronouncements like those of Bastioni et al. about the necessity of preventing inexperienced users from trying to produce “inappropriate” gendered morphings betray unconscious presumptions about the user’s end goals (Bastioni, Re, and Misra 2008).

‘Creativity support’ refers to that which “... enable[s] people to express themselves creatively and to develop as creative thinkers.” (M. Resnick et al. 2005). The term can be used to describe the affordances and purpose of software tools, as coined by Shneiderman (2002) and developed by Resnick et al. (2005), among others. Cherry and Latulipe (2014) have developed the Creativity Support Index, which specifies six areas of creativity support that can be measured within a given tool: exploration, expressiveness, immersion, enjoyment, results worth effort, and collaboration. A series of 12 statements (two for each specific area, for example: “What I was able to produce was worth the effort I had to exert to produce it” or “This system or tool allowed me to be very expressive”) are used to score the user’s agreement or disagreement with the statement, and the overall rating of the tool can be used to identify the overall usefulness of the tool for creativity support, and any potential problem areas that may need to be addressed. While the collaboration section may be omitted in the event that a tool is not intended to support collaborative creative processes primarily, these points provide a useful framework for evaluating the creative possibilities of a given system, which can be difficult to quantify.

Given these foundational principles for evaluation, which specific capabilities are important to creating tools for designing detailed, graphical digital objects? Iteration and creating multiple prototypes has been shown to improve users’ ideas and their execution in series (Dow et al. 2010). Dow et al.’s study

compared designers who created multiple prototypes of an advertisement at the same time, versus those who created single prototypes, received feedback, and created another, and so on, using the same design system. The prototypes created in parallel to one another were rated more diverse, received more clicks by independent users, and the designers reported feeling more self-confident than those in the single prototype group. Mueller et al. offer a system capable of low-fidelity easy fabrication for 3D printing of complex designs, exemplifying these principles in terms of low-risk fabrication and enabling iterative design processes for an otherwise complex task (Mueller et al. 2015).

Gaver's work on affordances in software tools is also instructive in this regard. The affordances provided by a particular system or tool can be evaluated based on the actions they make possible or obvious to the user, and designing affordances within software to mimic familiar actions in terms of other, physical world designs or user specific skills can increase the efficacy of such affordances for the user (Gaver 1991). Based on these principles, making a creative tool for modelling complex digital 3D objects like human avatars necessitates applying principles taken from the practices of creative users. In order for such a system to adequately provide the affordances necessary to make this process truly creative and not a mere exercise in which the form of a body is normative and prescribed, this tool must deal with shaping, forming and modelling bodies as a truly creative task.

2.8 Serendipity in Human-Computer Interaction

Software tools for modelling 3D human figures already include limited opportunities for serendipity, chance, and discovery as part of the figure design process. Interaction design choices such as libraries of figures and attributes on which to base further modifications, or randomiser functions like that of MakeHuman, can provide opportunities for users of these systems to explore options they might not have otherwise considered. Serendipity, described as the experience of “making valuable and unexpected discoveries by accident” by Niu and Abbas (2017, 360), is referenced in a variety of contexts and types of research in HCI fields. Resnick and Varian (1997) describe serendipitous recommender systems as either primarily aggregating information for the user, and/or providing particularly relevant recommendations from that aggregation to the user, based on existing data or the users' own data input. Previous research literature attempts to induce this experience across a number of digital and computational settings, from the music people listen to (Taramigkou et al. 2013; Huldtgren et al. 2014; Leong, Vetere, and Howard 2005), their navigation of physical space through digital means (Hornecker, Swindells, and Dunlop 2011; Huldtgren et al. 2014), the elective courses university students select (Pardos and Jiang 2020), to the information users of library (Waugh, McKay, and Makri 2017) and internet (Fan and Niu 2018; Makri et al. 2015) search systems encounter, among others.

Though user creativity is frequently referenced as benefiting from serendipity and serendipitous tools, few of these research inquiries examine the role or advantages of serendipity or serendipitous tools for artistic creativity specifically. *Alchemy*, a tool for exploration in digital drawing, is described as focusing “...on the *creative process* as opposed to the *created product*” (Willis and Hina 2009, 441); the authors note that creative software tools generally support the execution stage of the artistic process well, while failing to consider the role they might play in supporting the exploratory stage of creative work. This system suggests a series of abstract shapes to the artist during the sketching process which they are able to add to their drawing, allowing artists to build on associations with those shapes in creating an initial sketch. Interestingly, *Alchemy* omits the ‘undo’ function ubiquitous across most software platforms, which the authors describe as less well-suited to the open-ended, brainstorming stage of artistic work their system aims to support. In a similar vein, *Juxtapoze* presents a tool for creating customised clip art designs, through a workflow of searching, editing, and composing original icons (Benjamin et al. 2014). The initial search is generated based on shapes the designer doodles, and they are able to edit, cut and paste, illustrate on, and otherwise transform chosen pre-existing icons using a variety of digital brushes, pencils, and other implements available in the interface. Though serendipity is not expressly referenced by the authors, examples like Chaudhuri and Koltun's (2010) software tool, which uses shape comparison to suggest possible modifications to the artist during the early stages of modelling 3D objects, or *Sketch-to-design* (Xie et al. 2013), which suggests examples the artist might use for inspiration or integrate into their 3D modelled design, have strong parallels to these examples of artistic serendipity research in their functions and creativity support aims and outcomes.

The normative limitations of current tools for modelling 3D human figures also extend to functions which might offer a more serendipitous approach to modelling, with catalogue systems and suggestions constrained to a narrow selection of possible bodies. Though serendipitous systems which take input data from the user in order to produce a more relevant result are common, MakeHuman's randomiser only allows the user to ‘randomise’ certain characteristics of the figure, based on selected parameterised sections of the figure and producing limited variation. Secretan (2011) raises the question of serendipity-centred software tools as creative collaborators across a number of contexts, from music to visual art and 3D modelling, offering bespoke creative input rather than simply doing the artist's bidding to produce expected results. One might imagine that a redesigned randomiser tool for modelling 3D human figures could follow a collaborative design, suggesting paths forward to the artist in the early stages of modelling, with the mandate of disrupting gendered, racial, and ability-centred norms of the body in its representations. While it may be advantageous to allow the artist some limited control over the results that the randomiser affords, it may also be that the results of the randomiser represent a series of possible starting points within the tool, from which the artist is able to modify the figure to achieve a more specific outcome according to their own desire.

2.9 Digital Materiality

While the software tools used to model 3D human figures affect the figures artists are able to make through their design, affordances, and limitations, discussion of digital 3D modelling in an artistic context requires additional contextualisation of its role as an artistic material. In this sense, digital art, formally and materially, presents unique and complex questions because, as Paul (2015) describes, “...its medium resides in distinct materialities.” Materiality in the physical world is frequently conceived of as referring to apparent and inherent properties of the physical matter which make up particular objects or substances, and this understanding extends to artistic materials. Yet, in a digital context, an articulation of materiality as dependent upon physical, tactile matter falls short, because the processes of computation and software which might be described as ‘physical’ in this sense are not necessarily those which the artist or viewer ultimately interacts with or perceives. The materiality of digital materials, and digital 3D modelling in particular, can be understood in terms of its experiential and relational qualities and affordances, which define and influence how artists interact with, use, and reflect upon the artwork they create in this domain.

Though an understanding of digital materiality solely reliant on a traditional definition of physical materiality is incomplete for the purposes of this research, it is undeniable that digital processes are made up of, and rely upon, physical materials, hardware, and information in order to execute their relevant functions. As Casemajor (2015) writes, “...there is no ‘pure information’: code is inscribed; bits are written. Furthermore, the resources of computation are limited in terms of processing power, storage capacity and connectivity; its signals are prone to degradation, its devices to decay and toxicity.” Though imperceptible to the naked eye, the bits and electrical processing which make up and communicate digital information have matter and are physical energetic processes, much as hard drives, cables, and screens are tactile physical objects. Indeed, Kittler (1999) views these physical processes and materials as determinative of what meaning can be inscribed within a digital context, shaped and mandated by real-world characteristics and reliant on mathematical expression. To some extent, this approach articulates the limitations and outcomes of digital processes, illuminating the problems brought on by, for example, a mismatch between the amount of storage space or processing power required to run 3D modelling software on a particular personal computer, which often results in poor performance or unsaved data.

In contrast, Manovich (2002) focuses not on the physical artefacts and hardware of the digital, but on the ‘programmability’ of the digital as a definitive characteristic of its materiality. This emphasis on the way in which people interact with, shape, and influence computational systems is highlighted by his focus on digital visual media, drawing comparison with various forms of analogue visual media, film, and photography. He identifies five unique material principles of so-called ‘New Media’; specifically, its ability to be numerically coded, the modular organisational structure of digital objects, its propensity

toward automation, its emphasis on variability over reproduction, and the cyclical and reciprocal influence of cultural and computational elements of new media systems on one another. Rather than a computer's physical elements defining its meaning and use, Manovich (Ibid, 46) describes this relationship, saying, "As hardware and software keep evolving and as the computer is used for new tasks and in new ways, this layer undergoes continuous transformation." He goes on to reference the use of computers for producing visual media which, in turn, has led to similarities in the design and appearance of hardware and software with those of analogue media editing equipment. In other words, the tasks for which computers are used influence the development of their material characteristics, and vice versa. Even physical matter is not static in this sense, but shapes and is shaped in turn by its use, in addition to and in context of its characteristics and capabilities.

It is undeniable in this sense that physical computational material influences, shapes, and constrains aspects of digital materiality. Yet, materiality and material qualities, even in the physical world, are not limited solely to what they are physically made of, but rather, understood in relationship to human interaction, meaning-making, requirements, and use. Barad (2007) defines the term 'intra-action' to describe the intermingled, inseparable, and specific relationship between humans and non-humans, subjects and objects, research apparatuses and the factors they measure, in which one is unable to situationally exist without the other, iteratively creating meaning together. For Barad (Ibid, 137), "Matter is neither fixed and given nor the mere end result of different processes. Matter is produced and productive, generated and generative." Matter, materiality, and data are not naturally occurring or fixed, shifting depending upon how they are used, viewed, measured, and contextualised. Physical matter, computational systems, technological tools, and systems for measurement and recording of various phenomena are not separate from the material they create, the data they measure, or the humans who operate them, but are co-constituted, dependent and specific parts of a situational and situated contextual whole.

This section has, thus far, primarily addressed materiality through a discussion of matter, its constitution, and its relationship with and to humans, but matter and materiality are not synonymous, despite being frequently conflated. Leonardi (2010) addresses this limitation specifically through his discussion of three definitions of the adjective 'material' and their impact on understanding digital materiality; namely, that of 'material' as referring specifically to physical matter, that of 'material' as a "practical instantiation" of a theoretical concept, and that of having "importance or significance" to a task, context, or situation. In the first instance, he articulates that matter may be significant only insofar as that matter provides affordances to, or in relationship with, people, saying, "If what is important about "material" artifacts is how they are perceived and subsequently used, as opposed to what they are made of, then using the adjective "material" to denote that an object has a physical substance would seem relatively unimportant for explaining the contours of social interaction." Though the physical qualities and properties of a material may allow for particular uses or preclude others, what a material

is made of (or not made of, in the case of software programs and their digital material outputs) is less significant and meaningful than what it allows people to do.

The second definition of ‘material’ Leonardi (Ibid) describes deals with the practical manifestation of a theory, belief, or value. He takes as an example a software system for designing cars that does not let engineers move on to a further stage of the design process without first addressing the safety concerns relevant to the previous stage, thus making material the safety and management protocols required in the final design. In this scenario, materiality is the instantiation of an otherwise abstract concept; “Whether in physical or digital form, an artifact that translates idea into action is material.” The third and final understanding of ‘material’ enumerated by Leonardi is according to its significance to a particular person, process, or scenario. Describing the usefulness of particular features of Adobe Photoshop for various tasks and user profiles, he states, “Just like a material fact in a case, a piece of software can have certain material features — features that are “more significant” to the user than others.” Yet, this understanding of significance or relevance is not static, as the material importance of software features, tools, and systems may shift for an individual over time, according to task, relationships, interactions, and needs. In each of these various definitions of that which matters, is material, and has materiality, the use, practice, and interactions the artefact in question enables, affords, and influences is of primary importance to its material status.

This specific and contextual relationship between material and user, then, informs its relevant material characteristics, affordances, and specific materiality. Suchman (2006) clarifies that though humans, technologies and machines may be inseparable from one another and co-constituted in various situational senses, this inseparability does not dictate a sameness in terms of the role or contributions of the human or machine to their co-created material relationship. She elucidates the complex relationship between humans and machines through reference to computer-aided design (CAD) software, saying, “...the CAD interface becomes for the engineer a simulacrum of the site, not in the sense of a substitute for it but rather of a place in which to work with its own specific materialities, constraints, and possibilities.” (Ibid, 279) It is not that the interface becomes the physical situation or object which the engineer will ultimately construct, but that it allows the engineer to bring together various forms of knowledge, information, and ideas to be made material and meaningful. That the engineer, in this case, may have more control or provide the impetus to the encounter in some sense does not mean that the encounter is any less co-created, but that such co-creation depends upon situated people, machines, and tools.

Within this framework, a distinction is not explicitly drawn between materials and tools in terms of their materiality, since both materials and tools have materiality and whether something is a material or a tool is situationally dependent. This is also true in the physical world, where, depending upon how objects, substances, and people relate to one another, wood, for example, may be both a material being

shaped and a mallet or handle of a tool contributing to or facilitating the process of shaping. Though Paul (2015) points to the porous relationship between digital art materials and tools, wherein, “the medium in this case also enables the artist to create the paintbrush and palette”, such a relationship is not necessarily unique to digital tools, materials, and media. Though digital artistic works and software tools are similarly made up of code and calculations and displayed on hardware, the skills, motivations, and information required to create a piece of digital artwork using a software tool, and those required to create a software tool or function for use in creating digital artwork, often differ significantly. As such, it is difficult to say that digital artwork and tools are materially the same, even if they are, to some extent, made of the same stuff. The relational dynamic in which an artist uses and engages with a material, for which purpose, and in order to bring about, explore, or test which particular idea, all influence and inform the characteristics, affordances, and ultimately, the materiality, of that material.

Similarly, Paul (Ibid) articulates a disconnect, in many cases, between what viewers experience visually when engaging with digital artwork, and the code and calculations which create them; a separation which, she argues, does not exist in painting or film, where the paint and individual photographic frames which make up the artworks are immediately visible. As Paul notes, some artists do create artwork which directly or indirectly makes visible the code which produces the artwork, either through presenting the code itself as an aspect of the artwork, or through visualisations or other pictorial representations of the underlying data. In the case of computational art, this relationship is fairly direct; the code itself is, at least in part, the material which produces the artwork, and the artist interacts with it in order to produce that artwork. However, in the case of software which facilitates the creation and manipulation of digital materials, as in 2D or 3D imaging and design software, it is more difficult to isolate code or algorithms as the material itself, since the artist may not perceive themselves as interacting with those aspects of the program. In this instance, it may be more accurate to understand code not as equivalent to the paint or individual frames of a film, but as the pigment or binder, or light-sensitive silver halide or gelatine, respectively; though painters or filmmakers may also have the skills to engage with these elements of the material, interaction at that level is not necessary to create paintings or films.

The meaning, position, and importance ascribed to artistic materials, at least in a Western art historical context, are also worth considering insofar as they apply to digital materials and artwork. Wagner (2015, 26) describes artistic material as, “...the stuff which provides the parent substance for artistic creation. From this perspective, material — like matter — is part of a reciprocal relationship with form and idea, the bywords for creative intervention.” She explores the historical connection between a material’s perceived transcendence of physical matter and its elevated status, referencing specifically the association until the nineteenth century of arts like painting and sculpture, created by manual processing in workshop settings, as subordinate to singing or writing, which were seen to rely less on physical form and were therefore viewed as closer to ideas in themselves. Wagner (Ibid, 28) deconstructs the

dualism of material and idea, highlighting the gendered nature of such binaries, in which material is feminine and therefore of a lower status. In this sense, she questions the elevation of digital and computational arts to a similar perception of immateriality, in which concepts might be expressed without being tied to a persistent physical form. Of course, such artwork does have a physical form, but, more importantly, it has a material form, the relational and intermingled elements of which contribute to its realisation and ongoing situated, contextual position, as discussed previously in this section. Taking instead the connection between artist, material, idea, and form as interdependent and inseparable, a relationship between all relevant actors, substances, and concepts which would shift any outcome irrevocably can disrupt dualisms in favour of specificity.

Digital materiality, therefore, can be understood as relational and interdependent qualities, characteristics, and affordances of a digital material, defined as such because it makes visible in practice relevant thoughts, ideas, and information, through its use by, effect on, and relationship with the artist. Though digital materials may have matter in various senses, which may define their limits or capabilities, from processing power and speed to storage space, it is not these qualities of physical matter that legitimise digital materiality, nor is matter static and objective. Rather, matter is situated in relation to other factors and actors, which it affects and is affected by. Digital materiality makes tangible and instantiated assembled knowledge, context, and possibilities, co-created and specific to the artist engaging with a particular material. Likewise, digital artworks and the software tools which aid in creating them may each rely on code and algorithms in order to display and execute their functions, but this does not mean that they are materially the same, since their uses in context are distinct. The materiality of digital materials, including that of digital 3D modelling and its tools, makes plain the constant reorientation and subjective qualities of artistic materials during creative practice, where uses, requirements, and needs shift depending upon task, ideas, and possibilities.

2.10 Summary and Methodology

In the context of this background, an adequate usability outcome for 3D digital human figure modelling software requires room for a variety of approaches and outcomes, while emphasising a disruption of the bodily norms common in digital space. In a creative context, faithfulness to interactions that creative users recognise from other domains is an advantage, especially where such approaches can enhance user experience and connection to their practice, and may help to enhance both flexibility and usability for a range of users. This may incorporate direct manipulation techniques based on specific principles and actions from art practices and language which connects physical and digital practices in coherent ways, as well as affordances which use suggestion and serendipity to expand the possibilities the user might consider exploring using the system. These kinds of tools should support accessibility

for novice 3D modelling users, while allowing experienced users to continue to explore and use the software tool in new ways and to novel effect. Of course, these usability criteria must be applied to a tool which is able to support the shift I am seeking in my own artistic work, using the material qualities and affordances of digital mesh-based 3D modelling to explore alternative paradigms for visualising the digital body. This is the mandate that this research carries forward, toward prototyping a usable tool for modelling a diverse range of digital 3D human figures.

The remainder of this document will describe the process of research, design, prototyping, testing, and creation undertaken during this PhD research project, predicated on and influenced by the previous literature, software, and creative work discussed in this chapter. Owing to the unique nature of this research project, both in its approach to software for modelling 3D human bodies as a simultaneously creative, social, and practical design problem, and as a practice-based undertaking in terms of my personal artwork, a single, standard research methodology or approach would not provide an adequate framework for this project on its own. Rather, this research will draw on approaches and analytical frameworks from human computer interaction, interaction design and usability, the social sciences, and art criticism to create a cohesive series of methods to support, structure, and advance this multidisciplinary research project. To that end, this process consisted of a series of interviews with artists, applying insights from those interviews to developing design strategies and implementation in conjunction with research and technical concerns, user testing of the prototyped software with small groups of artists, and conducting an auto-ethnography of my use of the prototyped software tool and its experiential and tangible influence on my artistic practice.

In context of this project as ultimately producing a useful prototype for my own artistic work and for other users, achieving an adequate usability outcome for 3D digital human avatar modelling software required the consideration of a variety of user approaches, depending on a variety of user experience levels, intended output goals, and desired level of precision. In the sense of creativity support, faithfulness to interactions that creative users recognise from other domains is an advantage, especially where such approaches can enhance user experience and connection to their practice, and may help to enhance both flexibility and usability for a range of users. As such, conducting a series of focused one on one interviews with queer artists working in a variety of media, with different ways of approaching their practice and representing and interacting with the body in their work, provided a source of rich and contextually appropriate data about physical artistic practices, decision-making processes related to art and materiality, and the process of making art, with which to advance the design of the prototyped tool. The prototype brought together from this data and its analysis, in conjunction with existing literature in interaction design and creativity support, was tested with small groups of artist users who performed exercises, rated the prototype's creativity support features, and discussed their experience using the tool in group interviews.

In both cases, because this work does not build directly on established models or prior studies, the collected qualitative data was analysed according to a grounded theory approach, discovering patterns from the areas of inquiry addressed and the participants' engagement with and responses to those inquiries. While these studies did not follow a traditional grounded theory methodology, since they were conducted with different participants in order to address a different series of questions in each case, participants were given the opportunity to review and respond to the analysis of their data, thus creating an opportunity for them to revisit the topics we discussed and to engage with my analysis. Additionally, this approach allowed me to position myself in relationship to the participants in terms of rapport, data and the theoretical analysis, such that my status as a member of the communities that I engaged in these studies, as a queer person and as an artist, was able to enrich and further clarify the data that I was able to collect and the theories that I produced from those qualitative datasets. The Creativity Support Index (Cherry and Latulipe 2014) was also used as another metric by which to evaluate, discuss, and consider the usability and opportunities for creativity and expression offered by the prototyped tool. Using a combination of methods and frameworks from human computer interaction, grounded theory, and creativity support, this research creates an approach which is capable of appropriately encompassing the range of complex issues, fields, and questions addressed by and inherent to the work.

Creating a methodological approach to studying my own art practice and art work produced during the course of this research required another approach. These topics are addressed most directly in Chapter Six, which uses auto-ethnography conducted through a diary of my art practice using the prototype software tool, ephemera related to my practice and processes, and my own artwork to consider the qualitative, creative, and affective effects of using the prototype. Though auto-ethnography has been associated with the social sciences, its use and usefulness for artists in terms of considering and reflecting on their own practices (Bickel 2005; Smith-Shank and Keifer-Boyd 2007) and for computer scientists and human computer interaction researchers (Höök 2010; Lucero 2018) has emerged in recent years. Grounded theory coding procedures were used in order to analyse and clarify emergent concepts within the diary text, and theoretical frameworks, primarily related to usability, affect theory, creativity, and serendipity are used to deepen and specify the analytical framework of these entries further. When analysing and engaging critically with my own artwork, I use formal and critical frameworks from art history, theory and criticism to contextualise myself and my artwork within the cultural, aesthetic, and theoretical traditions in which they are situated, and use theoretical works related to power, pain, and queer and gender studies in order to discuss the themes present in the artwork and the ways in which my artwork and its conceptual motivations have evolved during this research and while using the prototype tool. This combination of approaches to the methodology of this research project allowed it to address the wide variety of issues raised during the course of the research effectively and appropriately, as the following chapters will discuss in greater detail.

CHAPTER III ARTIST INTERVIEW SERIES

In context of their use in artistic and creative work, 3D human figures can be considered representational art objects, characters, and/or sites of digital embodiment, sometimes in overlapping capacities. Exploring methods for interaction design that better match the function of such human figures as creative work, rather than as customisable objects with predetermined, parameterised characteristics, can mean providing tools, functions, and affordances which more clearly mimic real-world skills with which artists and other creative practitioners are already familiar. Indeed, Gaver discusses the usefulness of continuity between actions and affordances that people know from previous experience and those in software tools, allowing for quicker understanding and mastery of systems and interactions in those domains (Gaver 1991). How might a tool for modelling 3D digital human bodies more clearly incorporate techniques from creative practice in relevant media, in order to look beyond the confines of a primarily slider-based interaction model? How do uses of a slider-based manipulation method for modelling specific characteristics both indicate and perpetuate normative ideas about physical human diversity and reify them in digital space? Might treating avatar modelling as a creative endeavour, rather than a modelling exercise, help users to think about bodies and normativity differently?

Digital 3D modelling on a personal computer requires the user to design a three-dimensional digital object on a two-dimensional, screen-based surface. This may make the evaluation of the affordances of such a system, using previous experience, continuity from physical skills, and context clues, less straightforward, in addition to the basic spatial complexity of such a system. In order to design affordances for creative user interaction in this unique environment, a hybrid approach may be likely to be effective, drawing on techniques from a variety of 2D and 3D analogue media to achieve an accurate and appropriate relationship between the characteristics of the system and the users who will engage with it. Creativity and art practice cover broad and disparate kinds of activities, and in extrapolating practices for a digital environment, it is vital to identify which practices are important across media, in addition to what kinds of media-specific actions and activities are applicable to users in this setting. Furthermore, the available usability and creativity support literature which addresses creative practices tends to do so for the purpose of translating or supporting a specific activity in a

software environment, rather than investigating the stages of creating artistic work and how a tool might best support artists at various points in their process. As such, in addition to informing the development of a more expansive tool for creating digital 3D human figures, this chapter also begins to address a gap in research related to artistic process, the artistic context and use of the body, and physical art practice in Human-Computer Interaction.

My experiences of pushing human avatar modelling systems to their limits gives me first-hand knowledge of the limitations of these tools and their impact on my creative process, and my professional training in a range of artistic media, both physical and digital, provides some initial insights and clues for the potential applications of artistic interaction to software design. However, creating a tool which works for a wider variety of creative users means that drawing on detailed information about a variety of different physical practices is essential to this development and design process. While it may be possible to ascertain some foundational knowledge about specific artistic techniques from literature or instructional materials, this material may not reflect practitioner understandings or descriptions of their interactions with their artwork, especially for practitioners with less formal practices or training, and may omit the practitioner's embodied perspective by focusing primarily on the artwork as outcome. Additionally, the media and practices covered by or described in art historical and pedagogical texts have frequently disregarded the perspectives and contributions of marginalised artists, referring to their work as 'crafts', 'folk art', or dismissing unique stylistic choices as less legitimate, compared to those represented in the primarily white, male, and otherwise privileged Western fine art canon (Parker and Pollock 2013).

Rather than relying on a set of assumptions about what physical, embodied, and working practices might look like, as one might obtain from reading literature related to training in various visual artistic techniques or processes, I interviewed six artists working in a variety of different media who deal with the body, whether it be their own, as practitioner and/or performer, as a subject, or as a concept in their work. This chapter begins with a reflection on the process of developing the questions used in the interviews, drawing on the emergence of relevant themes in my artistic practice, and using handwritten notes and similar contemporaneous ephemeral information to aid memory and corroborate patterns of inquiry during this time, a method of recalling information which is used in contemporary autoethnography (Ellis, Adams, and Bochner 2011). These reflections engaged my own work, practice, and anecdotal experiences with existing research into usability and creativity support tools. The remainder of this chapter discusses the methodology used in these interviews and a grounded theory analysis of the data collected from the six participating artists, the results of which are then discussed using existing research.

3.1 Development: Questions and Study

While it was clear at the beginning of this research project that there were substantial questions to be answered regarding the suitability of currently available software tools for designing within the range of physical human diversity many people are familiar with in their day-to-day lives, the implications of these challenges and restrictions for creativity and artistic output represented a deeper source of concern. In order to understand the role that such tools occupied in my own artistic practice, it was important to consider and contextualise these tools in terms of visual creative practices and patterns of creation more broadly. Usability and creativity support research for making creative technology has involved studies of specific and topically relevant artistic practices and activities in the past (Kim 2007; Dow et al. 2010; Perry and Frisken 2001), or of use of creative software by novice users (Rivers, Adams, and Durand 2012; Chaudhuri and Koltun 2010), but consistent and clear broad information about how visual artists practice and understand those practices, how they make choices, why they choose their materials and ways of working, and which factors are involved in these choices was not available. These questions represented primary areas of concern for me as a practitioner, in situating the usefulness of tools for modelling 3D human figures in my own artistic practice, and in understanding what a redesign of such tools could offer me in expanding my creative options and those of others. As such, this section will discuss the rationale and ideas which contributed to the development of the artist interview structure and questions, and contextualise the focuses of the interview data and discussion sections later in the chapter.

The first area of relevance in contextualising my own use of existing tools for modelling 3D human figures was to consider where my use of these tools fit into my artistic practice. What did these tools offer me, and where were existing tools failing to meet my needs as a user not only in terms of their range of output and its affective consequences, but also in terms of their broader limitations? Though standalone tools for modelling 3D human figures are marketed as capable of being a singular environment for modelling, skinning, posing, and animating such figures,⁹ a cursory search of any forum for such tools reveals widespread anecdotal use of general 3D modelling tools in users' practices, as well as further use on other tertiary platforms. This was consistent with my own trajectory as a user, and with my own current practice, in which I use tools for modelling 3D human figures to sketch an idea or series of ideas during the first phase of a particular work. As such, these tools contribute to and facilitate aspects of the iterative, intuitive, exploratory stage of my work, while producing forms which remain present in later, more finished versions of particular pieces. Their limitations affect my creative work and process at an early and foundational stage, and it therefore was essential to consider which

⁹ Poser, DAZ 3D and MakeHuman all advertise or discuss the capabilities of their tools for animation, posing, and other aspects of their tools beyond modelling prominently on their websites and present these features prominently within the tool's GUI.

changes would be useful to me in developing a tool for use at that moment in my process of developing a concept.

Though this inquiry represented an important basis for proceeding with this research, there was little in the way of academic research or qualitative data available in order to contextualise and understand my practices in terms of those of other arts practitioners. Though research toward developing a tool for integration into a particular creative activity may study a discrete process or style of practice, broader information about the ways in which artists practice or studies exploring commonalities in approach across visual practices have not been addressed by previous work in this domain. Likewise, literature and research from arts and social sciences backgrounds does not discuss broader commonalities between practitioners across media or based on commonalities between different media. This literature also does not address the practices of artists whose omission from art historical and academic documentation based on their lifestyles, approaches, and perspectives reflect a societal bias toward the practices of white, male, upper class, abled, and heterosexual artists as more legitimate (Parker and Pollock 2013). Given the similar biases already present in currently available tools for modelling 3D human figures, the expansion of the perspectives in which the development of a new tool would be grounded, and the kinds of practices on which a redesign might rely, was urgent and vital to the goals of this project.

In light of the benefits described by Shneiderman in connecting physical creative practices that potential users would already be familiar with to interaction design elements in tools for making creative work (2002), designing with such references in mind presented an obvious and potentially advantageous solution to the problem of creating a usable, flexible tool for artists, without relying on restrictive GUI elements to achieve that simplicity. However, the complex nature of 3D modelling tools offers less clarity about which practices and processes might be most useful or directly relevant to reference; mesh-based 3D modelling technology relies on a hybrid combination of principles from technical drawing, physical sculpture, and animation, among others, in order to inform its current design and interaction principles. The complexity of designing an ostensibly 3D object on a 2D screen requires an approach drawn from different disciplines and practices, and expanding the disciplines and practices considered relevant in this domain may provide more adaptable interaction parallels for a variety of users.

Likewise, though general 3D modelling systems make some reference to sculpting terminology in certain functions available to the user, the terms used in these software tools might also benefit from a greater cross-disciplinary range of references and tools, using language familiar to a variety of creative users. Focusing on connecting these tools and the terms used to label and describe them to user action, rather than to the results of those actions on the figure body (as in parameterised systems), also presents another opportunity to integrate a direct relationship between the user's action and the outcome of

their action. Shneiderman (1997) describes invoking a direct relationship in this sense as beneficial, offering increased coherence and usability for a variety of users.

While drawing on a variety of different disciplines and techniques is essential when designing for creative artistic interaction in this complex design space, it is also worth considering the specificity of digital 3D modelling and the way in which I use it in my own practice. Though 3D modelling and mesh-based 3D modelling in particular have a variety of commercial applications and established processes for its production and use in those domains, as an artist working across a variety of media, the process of production and the stage at which work in 3D modelling becomes relevant for a particular project is variable in relationship to the physical and other digital elements used in the project. My process for the 3D elements is often similar in terms of the steps I go through, though it may vary slightly in terms of the number of unique elements or figures I produce and the intended outcome or destination for them (for example, whether they will exist as animations or as static digital objects, and on what platform). In most cases, I choose to produce physical and hardware elements of my artwork before working on digital and 3D modelled elements when making a piece which includes both elements. There are practical reasons for this, including the need to ship or deliver physical aspects of the work for installation before finalising digital elements and the ability to work on digital elements on a laptop computer in a portable manner relative to physical elements of the work. However, my perception of the level of risk and affordances available in digital and physical environments broadly may also be a factor in this pattern.

Specifically, the question of reversibility and the ability to undo actions in digital tools for creating art has produced what I perceive as a qualitatively different experience for me as a practitioner when engaging with these tools. Hutchins, Hollan, and Norman (1985) and Nielsen (1994), among other usability experts, emphasise the importance of forgiveness and reversibility in direct, creative, and usability-centred software tools, and the advantage of being able to reverse unwanted or disappointing manipulations is obvious, especially when the user is trying to achieve a specific outcome. The ability to reverse, easily undo, or incorporate the undesired results of the user's actions varies across physical media, but is consistent in most digital tools, particularly those which are commercially available, allowing the user a high degree of granular control over keeping or reversing each individual action. While I regularly use these functions in the course of my digital artistic practice, I have also produced creative tools which incorporate my ambivalence toward this functionality.¹⁰ Though usability research for creative tools often focuses on designing for a specific activity or outcome with a user's fixed idea in mind, given that my experience as a practitioner in both digital and analogue environments is variable and nuanced in these respects, it was important to understand how such practices function for other

¹⁰ One such project was *Watercolor Drawing*, a program written in Processing in 2015 which allowed me to make digital sketches of my own reference images using various visual effects, but did not allow me to undo my actions, and which saved my drawing automatically on exiting the program (regardless of my own desire to preserve it).

practitioners, in order to integrate other perspectives into my approach and to contextualise my own practice and needs as a user with greater clarity.

Finally, I was interested in exploring the role of the body in the practices of other artists, and in the work that they create which centres the body, whether their own or that of others. Though important for usability and interaction references in terms of action, the relationship between the practitioner's body, the body as an element of an artwork in a performance art context, and the body as it is represented in creative work is one that I have considered often in creating work in which I am also a performer and pictured as a digital animation or in a photographic capacity (in addition to work representing others). It would be straightforward to ask explicit questions about this topic; however, doing so might also cause any potential participants to focus primarily on the role of the body as represented in their work, or to focus on the body as distinct from their broader practice, rather than as part of and facilitating that practice. As such, the focus of my inquiry centred on the relationship between the potential participants' actions and their bodies in context. The materials an artist uses affect how they physically relate to those materials through action, with different materials providing different affordances, resistance, and tactile qualities to the practitioner (Giaccardi and Karana 2015). However, instead of querying their representation of the body, which might have resulted in answers primarily about the politics of representing the body, rather than the experience of it, participants were to be selected on the basis of the role that the body, either their own or others, played in their work. As such, a discussion of any potential participant artists' work in terms of action, modification, and practice, in most cases, was possible and necessary in the context of situating this work. The next section describes how the interviews were conducted so as to address the considerations described above.

3.2 Methods and Data Collection

In order to inform a reimagined design space for creating 3D human figures digitally, I conducted six semi-structured contextual interviews (according to the direction laid out by Lazar, Feng, and Hochheiser 2010, 209-10) with expert artists.¹¹ None of these artists are themselves users of software tools for modelling 3D human figures; rather, interviewing these artists allowed me to understand and analyse a variety of different artistic practices, and to contextualise my own artistic practice, needs, and priorities in relationship to those of my direct peers. While selecting artists who work primarily in digital 3D modelling might have provided a rich perspective on the perspectives and practices of existing digital practitioners in this domain, doing so would also have limited the artistic perspectives explored

¹¹ Ethical approval information for this study can be found in Appendix J of this document.

during the study to those who are able to work within the constraints of currently available software. To inform opportunities for further creativity support within such software environments, particularly common aspects of creative practice which are not currently well-supported by digital tools, artists working across a range of media were selected as participants for this study. Considering potentially novel ways of integrating creative action and practice into a software tool requires first understanding what those practices are, and which actions might be relevant candidates for matches or congruities between real world and system interaction design. Nielsen (1994) describes the advantages of heuristics which rely on the user's existing knowledge base, draw parallels between real world actions and conventions and those available within a particular software system, and use terminology and language that users are already familiar with. Such information also aids understanding of the roles that a software tool could play in the process of artistic creation, based on characteristics of artists' existing processes and transferrable qualities of the tools and materials they already use.

Number	Question
Q1	Describe your practice and artwork. How does your work involve physically manipulating materials?
Q2	Think about your practice in terms of action and interaction with material. List five verbs or adjectives that describe your actions during your practice.
Q3	Do you think of specific actions you need to take in order to achieve a physical result?
Q4	Can you change or reverse modifications you have made? Please describe.
Q5	What has been the most important physical skill for you to learn?
Q6	Think of the last finished piece that you made. Did you conceive of its physical form before beginning to make it, or did it shift over time? Is this typical of your process?

Table 1: The six questions each interview participant was asked during the interview

The participating artists were selected by invitation from within several geographically disparate queer communities I am a part of; several are personal connections, a couple are collaborators with whom I have worked in the past, and one is a friend of a friend. This method of selection was influenced by access, availability, and a lack of funding to pay research participants for their participation in this study. Though I became aware of opportunities for funding for the purpose of paying research participants within the Department of Computing after conducting these interviews, I was unaware that such opportunities existed at the time. As such, the participants in this study were limited to artists who were able and willing to sacrifice between 25 and 45 minutes of their time to speak with a researcher about their art practice; indeed, several other potential participants were contacted and were unable or unwilling to participate because doing so conflicted with paid work, caring responsibilities, and similar

obligations. My social, professional, and interpersonal connections to these particular participants may also have contributed to their motivation and willingness to participate in this study under these conditions. These limitations likely influenced the homogeneity of the participants with respect to relative class status, educational attainment (all of the participants in this interview series attended some form of university-level education, whether or not they ultimately completed a degree), and current geographical location in Europe and the USA.

The artist participants in this study were limited to queer women and non-binary artists in particular. This approach to participant selection is based on an understanding of queerness as what Haraway (1991) terms a 'situated knowledge', or what Ahmed (2017) articulates as a physical and spatial orientation of the body and self, which cannot be divorced from bodily experience. Participant artists were selected based on their queer approach to the body in their work with an eye toward representing a diversity of practice, whether that approach is visually or conceptually represented in the artwork itself, embodied in the sense of performance and engaging their body as their artwork, and/or embodied in the sense of a practitioner using their body in the creation process of their artwork. Additionally, close attention was paid to the range of materials and practices represented by the artists interviewed, and many of the artists also have significantly multi-disciplinary practices which informed their ability to speak to working with different types of media, and to compare and contrast the experience of working with different materials and in different formats. The input of the artist participants was intended to inform the facilitation of expressive and creative use of digital materials within the software prototype developed as part of this research, as well as to diversify the language used to describe available user actions in this software interface, using common and familiar terms across visual arts practices.

The artists selected and interviewed for this study were queer women and non-binary artists, whose practices and artistic perspectives on the body were of particular interest to this research. Within this demographic group, it was important to me as a researcher to ensure that the participants came from a range of backgrounds and experiences (though, as previously discussed, a lack of diversity related to class and educational background are limitations of this research study). Half of the participant artists are Black and/or brown people of colour, while the other half are white. While the participants in this study all currently live in Europe and the USA, at least three of the participants are themselves immigrants or are the children of recent immigrants from so-called 'non-Western' countries, and at least two participants speak English as a second language. Though I was disappointed not to include perspectives which centred visible physical disability in art-making more explicitly during these interviews, several participants in this study have personal experiences of long-term disability.

All of the six interviewees for this study are named and identifiable in their relevant professional and artistic capacities, though several use professional names which differ from their legal names. It was

important to me in writing this chapter to balance concerns about including the true range of perspectives present among these participants in a way which is legible to the reader, while also taking care not to tokenise the participants themselves according to diversity metrics, especially outside of the terminology they are comfortable using to describe themselves in a research context. Additionally, owing to the stigma of creating artistic work dealing with topics like queerness, BDSM, and sex work, among others, identifying individual participants according to characteristics like country of origin, for example, could present privacy concerns for some participants. As such, the reader should not assume a particular participant's relationship to immigrant status, disability, or other characteristics on the basis that it is not discussed specifically by myself or the artist participant in this context.

Each interview consisted of asking the artist a series of six questions (Table 1), followed by a 10- to 20-minute material manipulation exercise in which the participant worked with a material of their choice and described their actions to me in real time. The interviews were semi-structured according to the questions and regular prompts for description during the material manipulation section, but the order of the questions was varied as appropriate to the individual conversations. Each interview lasted between 25 and 45 minutes, and interviews were conducted in person in London, UK; Berlin, Germany; and Brooklyn, NY, USA, and via Skype with an artist in Miami, FL, USA. All interviewees except one were interviewed in their studios or home work spaces, where they had access to materials they regularly work with; one participant was interviewed in their teaching space and used digital materials, which they also regularly use.

Given all of the important factors, concerns, and questions present in the initial inquiry into the foundation of a redesigned tool for modelling 3D human figures, the questions the participants were asked were carefully considered in order to allow space for their experience, expertise, and practice to be foregrounded while gathering the information necessary to proceed with the design. The interview participants were asked to describe their practice, materials and process, and the way in which their work involved manipulating materials physically. They were asked questions about the way they approach their work, from whether their ideas are fixed for them at the beginning of a project or shifting, intuiting versus planning the actions they need to take in order to achieve specific results, and considering the skills which are most important in their practice. The participants were also asked about their understanding of the ease of reversibility and changing manipulations after they had made them in their practice. During the interview, the participants were prompted to list five action verbs which were important to their practice, and they were asked whether they taught students as a part of their practice, in order to give more information about potential overlap between their methods for communicating about their practice and experience imparting activities from that practice to others.

The interviews were video and audio recorded, and I took handwritten notes during the interviews. I wrote an initial memo, either digitally or by hand, immediately after finishing each interview, in order

to record the aspects and themes in the interview that were most memorable or significant to me, as well as any larger questions or themes that occurred to me during the interview (in the fashion described in Charmaz 2014, 165-168). The rapport between myself and the participant artists was predicated on shared commonalities and overlaps related to sexuality, gender, community, and identification and practice as working artists. However, it is also possible that complex power dynamics related to race, class, education, and language between the participants and myself, as well as the inherent power dynamic between interviewer and interviewee, played an unconscious role in the data that I was ultimately able to collect.¹²

3.3 Data Analysis

Transcripts of the conversational interviews and material manipulation sessions were analysed and coded according to the grounded theory coding process described by Kathy Charmaz in *Constructing Grounded Theory* (2014). This process involves a phase of initial coding, studying the transcript texts according to the specific questions asked within the data (Table 2), and subsequent focused coding, where significant, repeated, and analytically or theoretically useful codes are used to further analyse the data and form theories within it (Table 3).¹³ In order to aid in and organise this process, NVivo software (QSR International 2015) was used to maintain a coherent system from transcript to memo-writing. The transcripts were initially coded according to the interview questions, which were then coded thematically and organised according to larger common themes.

Initial Theme Codes	Example
5 Verbs (Q2)	Yeah, so it's composing, it's building, it's shifting, it's moving, it's... I imagine it like sheets of acetate sort of stacked on top of each other, and moving stuff up to the front and the back, and like you know, just layering stuff.
Changing or Reversing Manipulations (Q4)	I think that's a dangerous, or a hard, part of working digitally. You have this power of going back, and in a way it's almost like going back in time, like if you could reverse a situation or an action in your life.
Description of Work and Practice (Q1)	So I, mostly I get tied up, and I tie myself up.
Intuiting or Thinking About Steps (Q3)	I think there's some things that, depending on the material, you have to follow a certain formula for it to work. Sort of like, for things to be activated...The more formal stuff is quite intuitive once I get started.

¹² The importance of the acknowledgement of the researcher's subjectivity and potential power relationships and disparities with research subjects is discussed by Charmaz (2014) on pages 71-78 of the referenced volume.

¹³ For complete interview transcripts, see Appendix B; for a full list of codes with examples for this study, see Appendix C.

Manipulating Materials (Q1)	For linoleum cuts, I have to carve, like I carve, draw on and then I carve a sheet of linoleum, I have a chisel and I take long shreds of linoleum out. And then, I have this block and I roll on ink and then I print it.
Most Important Physical Skill (Q5)	Like just on a very basic level, like be able to use like power tools and build stuff is quite important. It's a universal tool that is necessary for, yeah, even everyday stuff.
Process (Q6)	Often I start with the subject matter. I start with my idea of something that I'll work on. I tend to start by designing first as opposed to processing thinking, and then I jump between the two.
Manipulation Verbs	Carving

Table 2: Initial codes and example text

During the focused coding period, the data was also coded to include emergent references to the body, the unexpected, and why participants described using particular tools, materials, and processes in their work (Table 3). The language that participants used to describe their interactions with their materials during the material manipulation section was also recorded and tabulated. While some demographic information related to education, employment in an arts related field, and teaching experience was recorded, the group sample size was too low to draw any broader conclusions from these demographic designations. Memos were written to describe, summarise, and synthesise the ideas reflected in each coded and sub-coded theme category. After this period of analysis, the findings were shared with the participants, in order to allow them to respond to the analysis of their words and practices, and to add or expand on the points they raised during the interview; all participants responded and expressed varying degrees of interest in or enjoyment of the content of the research, but had no further substantial feedback. The next section will discuss the analysed interview responses in organised detail, edited for the areas of clarity and interest to the overall aims of this research.

The Unexpected/ Child Codes (Excerpt)	Example
Giving up control	I really love that part because I feel like I really don't enjoy hand decorating stuff and the way I'm doing things now is it does it for me. The colours do their thing and then I get to see what it made which is great...
Inspiration from found objects	I bought a dildo and it was delivered in a beautiful plastic form, and I used the form to make plaster and concrete dildos out of it.
Low risk, easy experimentation	... something I love about clay also is the more that you use a single ball of clay and you make a mug and you don't like it and you smush it back and you re-wedge it, the more you do that, the better quality the clay is.
Using a medium because it gives unexpected results	I think in terms of outputs its really satisfying. It's very quick. It's a bit temperamental. It has a mind of its own. And I really like that and working with it.

Table 3: Focused codes and example text (excerpt), The Unexpected

3.4 Data and Analysis: The Interviews

This section describes a selection of the data gathered during the six interviews conducted with the participant artists, in context of my analysis of that data and its relevance to the aims of this research. Some of the data gathered can be most coherently understood in context of the range of responses to a question from the interview, while other data points are more clear in their relationship to a pattern of responses across questions among participants. While descriptions of the participant artists' practices and examples of their artwork are presented in more detail in Appendix A, some basic similarities between their works are covered here, in order to orient the reader to the following selected data. Bernie Daroux, as a ceramicist, Soofiya, as a visual designer, and Cloyo, as a rope bondage practitioner, use more or less singular descriptors for themselves and fixed sets of materials in their practice. In contrast, Sadie Lune, hari_klia, and GeoVanna Gonzalez work with a variety of materials and practices across different artistic projects, identifying their conceptual aims and practical concerns as the driver for their material choices. Bernie and Soofiya both engage in their artistic work for commercial, client-facing purposes; though the other participants may sell artwork on occasion or take a commission for an institutional show, they do not do so on a primarily commercial or client-facing level. Both Soofiya, as a university lecturer, and Cloyo, as a workshop instructor and facilitator, teach their artistic skills to others directly; the other participants do not, though they may teach on topics unrelated to art.

3.4.1 Q6: Think of the last finished piece that you made. Did you conceive of its physical form before beginning to make it, or did it shift over time?

The participants' responses to this question were distinct according to processes for client work and personal work, though they involved similar activities in each instance. Several participants described processes involving fixing initial ideas for a piece in their mind when working on their own personal work, aided by research and periods of intuiting throughout the creation and building process. Sadie describes the initial idea as a "skeleton" guided by notes and lists, where the concept and basic shape of the artwork is fixed but the details are intuited during the process of creation, saying, "I have my basic main thing that I'm representing when I start for the most part, and then as I'm painting I get more ideas, and little things come out of the woodwork and I'm like, oh yeah, that's how it should be, that's how it should be." GeoVanna describes the benefits of taking time to sit with an idea when working on it, and hari_klia also discussed a period of talking her ideas over with others, in terms of concept and presentation. In GeoVanna's words, "...as time goes on and the more research that I do, it [the idea] gets more developed in that way, and I think that a lot of the times like even in the moment I have this idea and I have it all figured out, but putting the extra time in, just to let it sit, even if I'm not working on that thing in particular, it has the time to evolve even more."

Soofiya describes their personal process in a generally similar way, as starting with designing with a loose idea or source in mind and working artistically first, and going back and forth between research, processing, and design as the process continues. They describe their sense of knowing when personal work is finished as intuitive and iterative, where they will save multiple versions of a file and continue working on it over long periods of time, not being fully satisfied until they choose to post a version on their website. hari_klia also described moments in her practice where she is guided by inspiration, saying, “I had a form where once I bought a dildo and it was delivered in a beautiful plastic form, and I used the form to make plaster and concrete dildos out of it. And then, I thought about okay, what can I do with it. So, that was the start of my experimenting with the material, and, but I didn’t wanna just throw it away, so I thought okay, I could make an installation sculpture out of it.” In this moment, hari_klia’s practice was shaped by an object that sparked creative inspiration, which motivated her to create a piece around that object and the feelings that came up with it.

Soofiya describes their client work as ultimately oriented toward a final product, and their personal work as process-driven, saying, “[...] if it’s client work, there’s always an outcome in mind. If it’s personal work, generally I like that there’s something I just work on. Sometimes like patterns, I just start doing them, there’s no outcome yet, they’re still in the process. And that’s okay. There might never be an outcome.” In their client-facing work, the finished product is clear from the beginning, and they know that they will go through a relatively linear process of research, design, and exchanging drafts with clients and incorporating their feedback. Working toward a defined deliverable for clients in a creative context is also an integral part of Bernie’s current practice; she describes her process of creating prototypes to make multiple ceramic objects for art fairs and similar venues, saying, “[...] sometimes I’ll throw just like for fun, for myself, but I’ve lately been throwing with a very directed reason, like, I need this mug to be perfect for this prototype because it’s going to make like 300 mugs...for the season.” As such, what the end product will be is pre-determined, and she is aware of the specifications she is working toward from the beginning.

3.4.2 Q3: Do you think of specific actions you need to take in order to achieve a physical result?

Participant responses to this question clarified that certain materials and practices require the artist to follow a particular set of steps, while others allow for more flexibility. Bernie described the steps of working with clay in order to throw a mug on the wheel, from selecting the correct amount to wedging the clay in order to remove air bubbles and increase its flexibility, to centring the clay on the wheel and opening it up in order to make the mug form. Performing these steps correctly each time is vital; not removing air bubbles will make the clay difficult to centre and may cause the piece to explode in the

kiln during firing, while not centring the clay correctly on the wheel will produce an uneven or unusable piece. Since she has to perform these steps each time she works, she uses her memory of those who taught her those steps in order to keep herself on track, saying, “I remember distinctly the different teachers that taught me to do the different steps or like even friends who taught me to do a trick or reminded me how to do something. And I still remember those people as I’m doing those steps [...]”

In Clyo’s case, working with ropes and the body to construct harnesses to restrict and suspend the body means that those harnesses have to be constructed in a certain way in order to be safe, and what is safe and appropriate can vary according to the size and shape of the body, and the person’s tolerance and needs, both physical and emotional. Getting it wrong can result in injury, and they say that they have an easier time intuiting the line in this sense when they are tying themselves and are able to tell their own pain limits, as opposed to those of others. However, beyond these restrictions, they say, “I come with certain, depending on my interaction with the person, I come up with certain stuff to do to them because that is how that is triggered in me. I want to tie them up because they have this beautiful hair, so I want that hair to be inside the upline. They have these beautiful feet, so I want the feet to be visible in a certain way.” Although their process is necessarily defined by safety restrictions and concerns, within those concerns, they are also able to make decisions about which solutions to use flexibly in the moment.

Though GeoVanna reports needing to follow specific sets of steps while using specific materials, she says that her multi-media practice is intuitive unless the material requires otherwise. She says, “I think there’s some things that, depending on the material, you have to follow a certain formula for it to work. [...] So those are practical, formalist things you just have to do. But more or less it’s intuitive, like the more abstract sculptural stuff that I make, and that’s more intuitive. The shapes they evolve into, the structures in all of that and the colour palette. The more formal stuff is quite intuitive once I get started.” Sadie describes a similar dynamic guided through notes and lists; hari_klia, on the other hand, describes planning out the physical execution of conceptual work, both for practical purposes in that physical execution, and so that she does not have to make multiple trips to the store for supplies. She says, “for example, if you make a box and you build it and you seal it and, actually there should go a ball inside of it, then of course you have to take everything apart again and put the ball in and then close it. It would make way more sense to first have all the sides ready and then you put the ball in and then you close it and then you are finished.” Since hari_klia is the only current student who was interviewed for this project, it may be that the volume of supplies she must buy, storage space, or money available to her causes this to be a primary concern. Soofiya was the only respondent who described being able to skip steps they had previously adhered to in their practice, citing their level of experience as a factor in this shift over time.

3.4.3 Q4: Can you change or reverse modifications you have made?

Two participants acknowledged that reversal is technically possible in digital media, though in one case, that response was prompted by the question's phrasing. However, in response, GeoVanna stated strongly that she is not interested in doing this, saying, "I think that's a dangerous, or a hard, part of working digitally. You have this power of going back, and in a way it's almost like going back in time, like if you could reverse a situation or an action in your life. That's pretty dangerous. I also think that it's not necessarily the best learning tool to have that much freedom." Soofiya did not report any qualms about this aspect of their digital design practice, but did acknowledge the difference between working digitally, where a key command can remove the result of a particular action, and working in pen, where direct reversal is not possible. However, they describe a process of using tracing paper in order to layer their drawings and omit or adjust parts they are not happy with, which allows them to follow a process similar to the periodic saving of various digital drafts of an idea which they describe.

For Clyo, reversing the tying that they are undertaking is possible, though it requires untying the rope. They also discuss, at another point in the interview, the fact that occasionally a mistake will require cutting the rope, in which case such a direct reversal is not possible. Though this topic will be referenced in more detail in the subsection discussing the role of the body, an underlying factor in Clyo's practice is that mistakes or damage to the body are a real possibility in their practice, and that in that case, those modifications may produce long-term or permanent results. Sadie and hari_klia each discussed strategies for incorporating mistakes into their artwork. For hari_klia, this might involve sanding a physical object or erasing a drawn line, but she ultimately suggests that starting over is likely the best way to approach a mistake. Sadie talked about covering or incorporating her mistakes in performances by improvising around them, or by repeating an action in order to make it look intentional. She states that the relatively loose format of her performance work allows these moments to be incorporated easily, and that incorporating mistakes in 2D artworks is more complicated (yet similar in terms of repetition), stating, "if I cut a big line through my [linocut], it's like I either decide that my [linocut] is going to have a bunch of lines through it and that'll be the new style, or it just looks crazy. It looks like I slipped and cut a big line through it."

Though other participants, particularly GeoVanna, described the potentially beneficial influence of mistakes on their practice, Bernie described mistakes at particular stages of her practice as unproblematic and directly beneficial to the quality of the material with which she is working. She described clay, particularly of the quality used when working on the wheel, as a material that retains memory, and thus multiple cycles of working with the clay, re-wedging the clay, and trying again tends to make the clay easier to work with. This is a quality of this particular material that is not necessarily shared by other physical materials, since it involves molecular rearranging of the material that is difficult to replicate, except through repeated physical work. However, Bernie states that this is not the case for

the quality of clay which she uses for slip casting multiple objects, and that, in any case, this reuse constitutes a “recycling”, a further action, rather than a reversal of an action.

3.4.4 “Wow, that’s a great shape”: The Serendipitous Unexpected

A theme that recurred in each interview was that the participant chose certain materials or practices for the ambiguity, unexpectedness or variation that they allowed, or incorporated chance and the unexpected in their practice, even when other aspects of their practice were carefully controlled. Both hari_klia, in the dildo form example, and Clio, in talking about being inspired by a dynamic or the body parts of a particular person, describe drawing sudden inspiration from particular objects, moments, or interactions, leading to larger ideas and works. Though Bernie must be precise in many aspects of her practice in order to produce usable, formally identical pieces, she also describes throwing on the wheel as allowing low-risk experimentation, where starting over is not a big deal and, “it’s just the slightest difference that makes a piece go from ‘Oh that’s nice’ to like ‘Wow, that’s a great shape’.” GeoVanna describes liking material, like clay or glass, which picks up imprints, whether of human touch or of the way it was formed, allowing for a uniqueness of each individual piece, and describes needing to incorporate her own mistakes and choices in making a piece as beneficial to her practice, even when she intended for another outcome. Likewise, Sadie describes allowing “room for surprise” in her practice by using processes in which her body is central, either as a practitioner, as in using her hands to create pressure and make imperfectly consistent prints of her linocuts, or as a material, as in her cervix viewings.

Sadie also briefly discussed enjoying crocheting because it is low-risk and she feels less pressure to be professional, allowing her to enjoy the experimental qualities of the media and the physicality of working with it. Soofiya details enjoying working with the risograph¹⁴ because it is inexpensive to print large quantities, saying, “I really like the process because the ink colours you’re getting on the riso, you can get gold, black... So, I think in terms of outputs it’s really satisfying. It’s very quick. It’s a bit temperamental. It has a mind of its own. And I really like that and working with it.” The speed and affordability allow Soofiya’s work with the risograph to be relatively low risk, and they are drawn to the surprising and unique results it produces as a source of inspiration and output. Bernie also describes the method she uses for casting the multiples, in which she uses different colours of liquid clay to create patterns she does not see until she takes apart the mould with the finished product, as allowing her to leave the visual decoration up to chance, which is helpful for her, since it is a part of the process she

¹⁴ A risograph machine is a printer which prints stencilled areas in singular colours of ink on paper; those colours can be layered to produce more intricate designs with multiple printing cycles, similar to silkscreen printmaking.

does not enjoy doing by hand. Opportunities for chance, inspiration, and the unexpected were different in the case of each participant, but ubiquitous across their practices.

3.4.5 How Artists Choose Tools and Materials

It is clear that the participants use tools to accomplish tasks in the course of their practice, and that they use the tools which are best suited to the task, have aesthetic qualities that they want or which are advantageous to them in some way, or because of their relative ease of use, sometimes in combination. Such a situation was described by Sadie when she talked about her video work, saying, “I’ll use for example natural light because it appeals to my aesthetics without having to know exactly what I’m doing camera wise.” Using natural lighting in this instance allows her to effectively light her video work in a way that she enjoys aesthetically, without requiring skills or technology she does not have access to. Though Sadie describes using tools which are fit for purpose and accessible to her, Soofiya describes their belief in the importance of using tools for their intended purpose, stating, “I wouldn’t use a paint brush to write my name on a form. It’s that kind of ethos and spirit I think.” Though this thought began with a description of the parallels between physical and digital skills in teaching students to be more comfortable using software for creative work, it describes both a keen implicit understanding of the practical design of creativity support tools, and a conviction about their reasoning for using certain tools in their practice.

Participants described using certain tools at certain times or in certain ways because those tools change or augment their body, and allow them to create effects that they would not be able to create using only their bodies. Bernie described her sponge as an extension of her fingers, saying, “[...] it’s like a softer surface area for the clay instead of your two pointy fingertips.” Later in the interview, she articulates the way water and other tools augmented her hand, versus when her hand would be the best tool to use for a task, stating, “And sometimes your fingers are really the best way to finish a spot because that’s where we have the most control, your fingers.” In this situation, her choice of tools depended on what she was trying to accomplish, the qualities of the tools themselves, and the relationship between them, a connection Bernie made clear. Similarly, Sadie discusses her decision-making process around which chisel head to use for her linocut in terms of the relationship between the size of the chisel, the pressure she exerts, and her level of focus and comfort in the activity. Being able to create the size of line she has in mind is dependent not only on which tool she uses, but also the way in which she uses it.

The relationship between the tools and the environment was also a factor in the participant’s choice to use them. While adjusting the placement of the metal pole in the wet cement during the material manipulation session, hari_klia described her process of deciding to use a string in order to centre the pole in the form, saying that she first tried leaning the pole against an object, then tried taping it, but

finally realised that she could use gravity to her advantage by hanging the pole from a string, ensuring that it would be straight once the concrete was set without ongoing effort on her part. In this case, the string decreased her labour while achieving an appropriate result. Conversely, participants also described using specific tools because those tools offered surprising results, or because of the ease of use and iterating through many ideas quickly. Soofiya described this phenomenon in their use of the risograph for making zines (as discussed in detail in 3.4.4), and in their use of tracing paper, digital layering, and multiple versions of the same project, but the idea of suggestion was clear in their use of The Noun Project¹⁵ to generate visual ideas and inspiration in their design process. They discuss using the website for ideas in both their client-facing and personal design work, especially in moments where they feel stuck or need to change an idea completely, pulling shapes suggested by their searches into their designs, manipulating, and incorporating them to consider multiple ideas.

It is worth noting that while in certain cases, the distinction between what was a material in an artist's practice and what was a tool was distinct, there were also situations in the course of the interviews where that distinction was slippery and contextual. For example, Clyo described the rope they use in their practice in terms that are similar to that of a tool, as a force and mechanism for moving, holding, and positioning the body, but also described the rope and other material implements like carabiners and suspension rings becoming a material aspect of the performance, combining with the body in order to create the ultimate positioning of the figure in space. Likewise, Bernie describes using water as a tool to change the way her hands relate to and affect the surface of the clay, but the water in this instance also penetrates and changes the quality and composition of the material, becoming a part of the material itself. The natural lighting Sadie uses as a tool also becomes part of the film during the filming process, making up the material content which is then manipulated during editing and post-production.

3.4.6 Q1: How does your work involve physically manipulating materials?

hari_klia addressed the use of *manipulation* as the verb for this query, identifying a double meaning in manipulation as working with a material, and manipulation as an emotional interaction tactic toward a particular end. She describes using manipulation in “tricking” her audience into experiencing certain emotions, stating, “I take them out of their comfort zone and confront them with things. Which for me, is like a task to make them think about things they wouldn't rather think about, or in ways they wouldn't think about. So, I guess maybe, I transform the material audience.” This phrasing also positions the audience as a material to be manipulated, and ascribes materiality to the audience's emotional or reflective state, another material strata on and with which the artist can work. Clyo described a similar relationship in working with the emotional states of and dynamics with others as part of their rope bondage practice; they say of those manipulations, “It can also be an emotional

¹⁵ <https://thenounproject.com/>

manipulation, especially depending on what the people who are being tied up or doing the tying, how they feel that they want to interact with those emotions.”

GeoVanna discusses manipulation of materials in her practice in a similar sense, in that she camouflages materials as other objects and materials, creating synthetic versions of natural objects, or recreating functional objects in materials which render them non-functional for their original purpose. She uses the examples of painting a fake plant to look as real as possible and resin-casting C-clamps for use in her work during the interview, stating, “It’s not serving any purpose, the plant’s not serving any purpose, it’s not like growing, it’s not like helping the environment or anything like that, it just has its aesthetic appearance.” This represents another version of tricking the viewer, while inviting the viewer to reflect on their relationship with the aesthetic versus the functional in their own lives and cultural experiences. While these responses involved discussion of manipulation in terms of the emotional states of the viewers, there was also discussion of manipulation as it refers to the body itself as a material; this will be discussed in more detail in the subsection discussing the role of the body in the interview responses.

Though a more fulsome description of references to using the body to manipulate materials by the participants will be addressed in the sub-section detailing reasoning for using and choosing tools and materials, it is also relevant here to briefly discuss references to using the body to directly manipulate materials in art practice. Sadie described using the pressure of her body and household objects to create ‘rubbed’ prints from her linocuts, creating an uneven and experimental effect which is quite different to using a press to create a print, which distributes pressure evenly across the surface. Clyo describes using their ropes to tie others and themselves, implicitly using ropes and gravity to manipulate the body, but also describes how the reuse of the same ropes in their practice requires them to engage in ongoing care and conditioning of those ropes. They say, “[...] these ropes have their own materiality, so you have to work with them, you have to treat them, you have to burn them, you have to put some, maybe sometimes you have to boil them, you have to put some baby cream or jojoba oil on them.” As Clyo describes, the materiality of the material in question requires its own manipulation and attention in order to maintain its usefulness, adding an additional layer to our understanding of materials and their relationship to the art they co-create.

Meanwhile, hari_klia’s example in questioning the relationship between the performance and bodily experience of eating fruit in her artwork, *Eat Pussy* (2016), and the documentation video and images which are ultimately presented to the viewer. She positions the fruit as the material in relationship with her body, depicted and manipulated in still images and in the video but not *in itself* the artwork; she states that the material ends up “inside of her” but that the artwork, as the process of eating it, is not inside of her, though this might be achieved by eating the pictures (which she has not done). The documentation of the process, from cutting the fruit to eating it, becomes a separate work on its own,

and the recording is still yet another material. Sadie describes interacting with materials through talking with them directly, saying, “I don’t know if I do this with performance but visual, video things where there’s a specific object or material that I have to manipulate, I think I talk to it a lot. Especially when I’m frustrated. [...] Also I ask questions verbally out loud of my materials, like ‘wait what am I supposed to do here, ahhh’ . ‘What are you doing?’ ‘Don’t do that’, yeah, things like that. In this sense, the material relationship is made explicit, another participant with which the artist interacts and is influenced by and vice versa.

3.4.7 The Body: Practitioner, Material, and Subject

Practitioners described paying close attention to the way their body was interacting with material. Bernie described this in a very physical, body-centred way, detailing at times where her body needed to be in space and in relation to the material and why, both in terms of the outcome in the material (for example, incomplete pulls on the wheel, or not getting all the air bubbles out of the clay) and in terms of the material or activity’s effect on the body (a particular position causing pain asymmetrically). In Bernie’s own words, “What I’ve learned is the most important part of this is using your whole body to push forward and not just like, your arms and your wrists. That’s a big part about ceramics and throwing, it’s really like putting your whole body into it, so you’re not just hurting one part of yourself.” GeoVanna described her hands changing the quality of the clay by causing it to dry out during the course of working with it, while hari_klia detailed an early experience working with cement where she touched the cement with her bare hand, resulting in extremely dry skin, which she described as feeling “very awful”. Since then, she has paid more attention to the effects of the materials she uses on her body and her health, and wears protective equipment (gloves and masks) when mixing particulate materials to create cement.

Safety was also a major concern in Clyo’s interactions, where their practice requires them to navigate how they engage with ropes and how those ropes engage with a body, whether it be another person’s body or their own. They describe more possibilities for harm when tying others, stating that they are most focused on the dynamic and facilitating ongoing communication to avoid hurting the person that they are tying, unless that pain is part of their negotiation. They say that though they go through a similar process of negotiation with themselves, they have less immediate concern when working with their own body, since they are able to feel what they are doing as a practitioner as they are doing it, saying, “[...] when I’m tying myself up, I’m better at assessing that so because I’m hurting myself I can make that pain, I can choose to make that pain go away in a safer way. I know the exact limit.” During the material manipulation session, as they were tying themselves up, they stated, “it’s as if I’m tying someone up, I’m thinking what sort of a sensation do I right now feel like having in my body.” They describe a hybrid relationship to their own body in this instance, especially when performing in front

of others, where their body is simultaneously a practitioner dictating the scenario, a material to be manipulated, a visual subject whose position will be read, assessed, and interpreted by others, and an embodied self, experiencing their own artwork in real time.

The relationship between the body, material, and the way it is viewed was addressed by hari_klia in several different instances during our interview. Her discussion of her artwork, *Eat Pussy* (2016), and the relationship between the cut up fruit she licked and ate, her body, and the documentation of the piece, is indicative of the complex relationship between body, material, and artwork. She says, “So, I also put the material inside of me in the end. But if you would say, the art piece is only the picture, then it’s something different I guess. Because the picture is then standing apart from it. And it’s just about the aesthetics and the meaning that the title gives it. And yeah, so I’m not eating the picture, so it’s not, you could say, the art is not inside of me, but maybe the process, how I ate the fruit.” Whether the documentation, the physical process, the experience, or the fruit is “the art” reflects a complex relationship between intention, material, and the body. Similarly, her description of her video work, *leben und sterben* (2016), in which she was naked in the snow for an extended period of time, such that her body melted the snow around it, manipulating the environment, while she became so cold that her body temperature dropped dangerously, which she describes having experienced and which is also included, in an audio format, in the video documentation. hari_klia’s desire is to make work which causes her to feel physically exhausted as a practitioner in her body, and through which she is able to inspire empathy and feelings of similarity in others, whether through costume, performance, or interaction, describing further engagements of her own body and the bodies of others in her work.

Sadie describes the experience of using her body in performance as a negotiation between her control, her comfort, and being surprised by her own body, saying, “One time I was doing a performance where it was simple, but it was based on the egg in my cunt, and I could not get that egg out. I’ve done this plenty of times, it’s not like it’d really get stuck, but in this particular moment it took FOREVER, and then I had to work with that, also being stressed out like, what if it doesn’t come out! That’s the whole thing I’m doing!” She also describes how this suspense, and its outcomes can influence the audience’s perception of performance work: “Though sometimes I’m surprised, usually I’ve gotten quite good at placing it in the right place with the speculum pretty fast and getting it in the right place, but sometimes I have to dig around, and then the audience has to watch me dig around and get increasingly uncomfortable. [...] if they perceive that there’s a relationship to physical discomfort, that it’s not going easily or whatever, I think it can really freak people out.” In this sense, the audience’s empathy with her physical experience and physicality as a performer is something that she notes and which becomes a part of her experience of performing, in which her body, actions, and body fluids facilitate and participate in intimacy in a performance context.

Creating experiences for the audience in terms of physical or experiential bodily engagement was discussed from the perspective of manipulation of the audience in the Manipulating Materials subsection; GeoVanna, however, takes a different approach in her artwork. She describes creating experiential environments for her audience, in which she engages multiple senses, considering how the environment feels, sounds, and smells to a viewer experiencing the space. In this way, she tries to imagine herself within the physicality of the viewer when developing her installations, empathising and understanding their potential experience when building her work. Soofiya represents the body in their work, using the body as a metaphor to represent emotions, as in *The Book of Anger*, and makes visual work based on their own experiences in their body, using visual representation to translate complex topics into an understandable format. Though Clyo describes the body as having implicit restrictions, in terms of what we can do with our own bodies, in how we are able to represent concepts using our bodies, and in how our bodies are read and given meaning, within these restrictions, it is clear that these artists use, experience, represent and create with their bodies and those of others in contextually specific and varied senses.

3.4.8 Verbs and Actions: The Material Manipulation Session

This section looks at the verbs that the participant artists used during the material manipulation session, when prompted by the researcher to describe their actions or when describing their actions of their own volition. Overall, 130 unique verbs were used by the participants across all interviews, and both the inflected form (for example, “pressing”), the infinitive form (“to press”), and, where situationally appropriate, the noun form (“applying pressure”), were counted. The most frequently used verb was “pulling”, while the most widely used verb, occurring at least once in all sessions, was “using”, primarily in reference to tools or techniques. While many of the verbs directly referenced physical actions, others were descriptive of the practitioner’s inaction or emotional state, as in uses of “waiting”, “thinking”, “remembering”, “seeing”, and “checking”, amongst others; “feeling” bridged this gap as it was sometimes used to describe physically feeling an object or material, and at other times, used to describe perception or emotion in working with the material. Though some verbs shared similarities and roots, for example, “pressing” and “compressing”, these forms were initially recorded as separate instances and not specifically grouped together.

Which verbs participants used to describe their actions were dependent on the tools and materials they used, as well as the language common in particular fields and practices, even if the basic movement and outcome of their action was similar. “Chiselling” was only used by Sadie, as she was the only participant who used a chisel during the session, “copying” and “pasting” were only used by Soofiya, who worked digitally, while “centring” was only used by Bernie and is a common term in ceramics practice for making sure the clay is attached firmly to the centre of the wheel. Sadie is also the only participant who

used the verb “carving”, but there is a clear similarity between the action and outcome of carving into a linoleum block with a chisel and “pressing” with a pointed fingertip into soft clay, as Bernie and GeoVanna describe doing (and indeed, Sadie also describes pressing at certain points during her session). While “positioning” was used by Clyo to describe moving their body during the manipulation session, “moving” was used by Sadie, hari_klia, and Soofiya to describe the position of objects, activities of their bodies, or steps in a process at various points during their sessions. Some words were in reference to distinct outcomes or effects for the material, like “shaving”, “thinning”, “peeling”, or “arching”, offering potential opportunities to consider both the movement which creates these results and the distinct properties of the results themselves.

3.5 Discussion

This section examines the implications of the data collected in the artist interview series, in order to inform the design space, conceptual framework, and potential functionality for 3D human figure design software. While a literal digital replication of analogue practices in physical media is not a feasible or desirable outcome for this redesign, the goal is to use the processes, steps, and priorities of artistic practice to rethink which form the figure creation process might take. Of course, an exploratory, flexible, or less constrained approach to software-facilitated figure creation does not in itself guarantee greater creative affordances to the user, but it is a precondition for achieving a figure design tool which makes fewer implicit assumptions about the user’s intent.

3.5.1 Tool and Material Use in Practice

Existing research on creativity support tools emphasises the importance of flexibility for a range of users and relevant uses. For instance, according to Resnick et al.’s directive that creative software requires “wide walls and high ceilings” (M. Resnick et al. 2005), the affordances of current human 3D modelling software might be described as having middling walls and a low ceiling, with a constrained user interaction design paradigm using sliders mapped to various fixed-range design parameters. In a human figure design context, considering how the tool is able to support creative use at various stages in the processes that the interview participants describe in 3.4.1, from inspiration to exploration to development and execution of a fixed idea, is one sense in which the artistic merit and possibilities of such a tool could be evaluated. Further mechanisms to prototype ideas quickly or have ideas suggested by the tool itself and the ability to control the amount of detail or degree of effect of a particular tool on the figure body are additional strategies for integrating the tool into artistic practice more effectively.

Additional flexibility in terms of the speed of prototyping available to the user could benefit a range of processes and tasks when creating human figures. It is arguable that painstaking, detailed, and singular execution of a developed idea is reasonably well supported in current software, although the assumptions related to the user's intent when creating figures using these systems and inherent to the interaction methods used limit the level and variety of detail that can be modified. Meanwhile, processes or stages of conceptual development which involve sketching multiple ideas quickly and comparing them may be less well-supported by a singular figure which the user is able to adjust at a high level of detail. Soofiya, in particular, described iteration and casual engagement as important in their personal process, and many other participants described engaging in exploratory processes at the beginning of developing a piece. Currently available software models present very limited mechanisms for more casual engagement, thus hampering the ability to engage in exploratory and discovery-led practice. Introducing capability in order to facilitate rapid and less parametrically complex prototyping may also prove advantageous; the benefits of parallel and rapid prototyping in creative domains are well-documented in research contexts (Dow et al. 2010; Mueller et al. 2015).

While the ability to compare multiple prototypes created using tools for making 3D human figures is available in exporting and importing multiple figures into a general 3D modelling system, the functionality available in tools for modelling 3D human figures and general modelling tools does not account for exploratory rapid prototyping sufficiently, or for unexpected results, which participants described as integral to their practice at various stages in 3.4.4. Some tools do include a randomisation function, but this function often allows the user a high degree of control over its outcome, by giving the user access to a range of sliders or other GUI elements, or by limiting the characteristics to which the randomiser can apply (or both, in the case of MakeHuman's randomisation function). Benefits and advantages to engaging in low-risk rapid prototyping in creative practice has precedent in previous research (Kulkarni, et al. 2012; Savage 1996), and the positive influence to creative and artistic practices based on suggestion of multiple relevant ideas during the process of developing a concept is similarly clear, based both on the interview data presented here and relevant studies (Peng, Xing, and Wei 2018; Faste 2017; Chaudhuri and Koltun 2010; Dow et al. 2010). The role of serendipity and the experience of discovery in creativity and its positive influence on the generation of new ideas (Faste 2017; Willis and Hina 2009; McCay-Peet and Toms 2010) similarly reflects the extent to which a random figure generation function built to prioritise a range of bodies and possible modifications might present exciting opportunities for discovery and rapid prototyping while challenging norms around the body itself.

Like the process described by Sadie—of working from larger areas to more detailed, smaller cuts with a chisel in her linocut—the option to apply a tool to a larger area before honing in on details has considerable advantages when creating intricate work. The ability to move from working with a greater level of detail, as in full modifications of the figure body, to increasingly detailed areas, may offer a way

to integrate and categorise modifiers coherently for users, without relying on delineating the body itself using problematic or limited terminology. Rather than a slider-based system where modifications are applied uniformly across a pre-determined section of the avatar, users might benefit from having control of the level of detail they are manipulating on the figure body dynamically. GUI-based solutions like sliders with a range limitation function rigidly in this regard, but a system which allows for open-ended interaction, like that used in a cursor-based direct manipulation system (the basic design tenets and advantages of which are covered extensively in Hutchins, et al. 1985; Shneiderman 1997), might benefit from the ability to access various modifiers flexibly and seamlessly by interacting directly with the figure body itself.

3.5.2 Language, Familiar Actions, and Interaction

Applying Nielsen's heuristic of matching the language used in the software tool to language used in the "real world" to describe similar actions (Nielsen 1994) can also be instructive with respect to addressing the hybrid and complex spatiality of creativity in digital 3D. The language that participants used in describing their creative actions and interactions during the material manipulation session (see 3.4.7) can easily be adapted to describe tools for understandable and straightforward digital interaction as appropriate. For example, words like "pushing", "carving", and "rounding", all used by interview participants to describe their actions while working with their material of choice, can describe the effects of various functions in a software system for modelling 3D human figures. Employing descriptive language used by practitioners may also be useful to differentiate and refine the variety of functions with similar but divergent capability (the difference between "pushing" versus "carving" the avatar mesh, in one instance), both for the software designer during the interaction design process, and for the artist as the end user to more clearly understand the capabilities of each function.

Such terms could also further emphasise the connection between the artists' familiar embodied interaction and the modes of interaction available to them when using the software tool. Rather than describing characteristics of the model itself, as is common software for modelling 3D human figures presently, the terminology employed in a redesigned tool might describe the artist's action and the relationship between the artist and the 3D material. This strategy for describing and delineating the options available in the software environment eschews normative labelling of the figure body, and re-centres the artists' body, and their use of tools to augment and extend their body, as an active participant in the relationship between themselves, the material, and the work that they create. Likewise, use of descriptive language may aid the artist in thinking about and understanding the tools available to them in these programs as analogous to embodied processes they know and exercise elsewhere in their artistic practice.

3.5.3 Materials and Materiality

As the participant artists showed clearly during the interviews, various materials have different qualities, advantages, and affordances and offer different contextual experiences to artists in the course of their practice. For the interviewed artists, all of who either work with multiple materials or singular materials in different states or discrete practices (as with Bernie and thrown, hand built, and liquid clay, for example, or Clio in tying others and themselves, in suspension and on the floor), these differences inform their choices, actions, and the artwork they ultimately produce. While translating and recreating the affordances and interactive qualities of materials can be an advantage in creating usable digital functionality and software tools, it is also worthwhile to consider that digital materials themselves have their own materiality, around which artists make similar calculations according to their skills, needs, and desires. Whether in terms of the degree of immediate and fine-grained reversibility users are able to exert in digital environments, the portability of many large digital projects relative to other physical or analogue material outcomes, or qualities of individual digital materials when used with digital tools, the qualities, affordances and advantages of these materials influence users' reasons for choosing and engaging with them.

Specifically, mesh-based digital 3D modelling has its own materiality, affordances, possibilities, and difficulties, and aspects of this materiality inform why users choose to, for example, model a figure in digital 3D rather than sculpting it in clay or painting it on canvas. Incorporating a wider range of functionality and references from physical practice might contribute toward a more satisfying and consistent relationship between the user's actions and their effects in a 3D modelling tool, a relationship which Nielsen describes as important in creating usable software systems (Nielsen 1994), and it is clear that this space is ripe for a redesign, with creativity, usability, and normativity (in multiple senses) in mind. At the same time, whether for aesthetic reasons, the ease of making particular parametric or geometric modifications in mesh-based digital 3D models, or other reasons, it is important to consider the ways in which changes to the interaction design and functionality of 3D materials affect the experience of those materials for the practitioners and the outcomes they are able to achieve. Giaccardi and Karana (2015) describe the way in which different materials offer different experiences in this regard, and Paul (2015) convincingly describes the distinct materiality of digital media in particular. Nuance and sensitivity related to the context of the body, the unique capabilities and affordances of digital mesh-based 3D, and novel methods for considering the interaction between the user and this material in similarity and difference to other artistic materials can push interaction forward in this domain.

3.5.4 The Role of the Body

The relationship that participants who use their bodies in their work as performers, particularly Cloy and Sadie, described in 3.4.7 between their visual and sensory experiences of their body during performance also has implications for the role of 3D human figures in digital space. 3D human figure modelling tools, character creation interfaces, and other environments for creating similar digital human forms tend to picture the figure body from a frontal, un-posed view, and while there are clear advantages to viewing the figure from multiple angles during the creative process, this view on creation does not always reflect the intended role of the figure being created. Considering that digital figures may simultaneously be art objects, characters, and/or sites of digital embodiment in various combinations (for example, a character which is both playable and viewable by the player/other players at certain times, or an art piece with first-person and interactive or third-person components), it may also be useful for avatar design software to incorporate aspects of how the figure will be viewed or experienced into the design process.

While human figure modelling tools allow the user to view the avatar from various angles and distances, no tool that I have encountered includes a view during the design process from the figure's perspective, as would be present in first-person gameplay or digitally embodied experience. A variety of camera views exist in most software tools for modelling 3D human figures, but they default to full body, distanced views from fixed angles, sometimes offering the opportunity to pan or zoom in, though these capabilities may be limited to particular distances. For users who are creating playable characters or embodied experiences, the proportions of the figure's hands, arms, and nose may be of primary importance during the artistic process, and allowing artist to create from multiple perspectives would allow them to prioritise the importance of relevant perspectives in their process. Cases like that of the woman of Willendorf, assumed to be an early instance of erotica for decades before being reclassified as a self-portrait based on the similarity between the proportions of the figure and the perspective of a woman looking down at her own body (McCoid and McDermott 1996; McDermott 1996), clearly illustrate the importance of perspective in evaluating and considering representations of the human body in artwork, particularly marginalised bodies.

3.6 Conclusion

The data collected during these interviews from the group of artists push the design space of 3D figure modelling software beyond topics covered by previous research by providing an embodied, experiential perspective on art practice and process. Understanding how these artists perceive their workflow and choices, in the context of their specific skills, provides useful information for developing a redesigned

creative software program because it offers insight into artist's processes, decision-making, and experiences, and in which contexts and circumstances they make these choices. This can help us understand the limitations of 3D human figure modelling software as a design space, while also providing background information for why creative users might choose digital 3D modelling to represent human bodies over other methods, and how the commonalities between these individual practices, experiences, and decision-making patterns can be applied successfully to the hybrid digital 3D modelling space. The interviews also provided important information about the language that artists use in practice to describe their actions, with parallel references, which is applicable to both the process of interaction design and to ensuring that those functions and their textual labels are understandable for end users. This research into the physical, chronological, and embodied practices of artists may also be useful beyond the direct context of this software tool, since it identifies and begins to address gaps in existing literature about art practice, usability, and creativity support.

Chapter IV Designing CreatorCustom

The interviews conducted with artists, as discussed in Chapter 3, provided a useful foundation on which to base a potential prototype, from considerations of the processes and activities that make up their practice, to allowing for surprising and unexpected results as part of that practice, the relationship between their decision-making around materials and materiality, the role of the body, and what they are seeking to communicate with their work. While the concepts taken from the participants' statements might be used to inform a number of approaches to designing software for modelling 3D human figures, it is important to understand their feedback in context of existing systems and paradigms, and ethical and representational priorities in designing digital human figures themselves. How can the principles and priorities they described in their practices be applied to a digital 3D modelling design space effectively? Which practices, concepts, and parts of language can be designed into such a system, in order to make it more understandable for users who are not familiar with similar software tools? How might these interaction design choices impact the relative normativity of the figures that the user is able to create, in representational and artistic senses?

This chapter will discuss the ideas, thought processes, and design choices which ultimately resulted in the prototyped software, CreatorCustom, finishing by describing the prototype itself in detail. This discussion begins by examining the intersection of the data collected during the artist interview series and the background research literature with relevance to designing creative tools and usable 3D modelling software, coming to a synthesis of these ideas which draws on each of these sources, while creating a tool which will be useful in filling the necessary gap in my own artistic practice and maintaining continuity between some existing conventions in the 3D modelling pipeline. From there, the representational and formal priorities in developing this system, including the relative importance (or not) of creating anatomically correct figures, and the material possibilities of 3D modelling using mesh-based objects are delineated. While certain challenges encountered during the implementation of interaction design solutions are included, this chapter finishes in a description of the prototype, its design, and its capabilities in more specific detail.

4.1 Possibilities and Strategies

A combination of research literature and data gathered during the artist interview series provide several possible frameworks to move forward in designing a system for modelling 3D human figures, several of which were considered at various points during the development process, alone or in combination with one another. The first possibility consists of a re-consideration of the materiality of 3D modelling itself, and whether a closer material similarity to physical 3D materials such as clay might result in a more usable system for making 3D human figures. The second option might involve expanding the integration of 3D modelling with physical art practices, wherein the user might be able to directly translate a drawing or sculpture into a digital 3D model. The third option, which describes the approach and strategies which were ultimately used to design the prototype software created as a component of this research, highlights the user's interaction with the system, with the goal of translating actions that make the system itself and its capabilities easier to understand in context of the tool as mesh-based digital 3D modelling software. This approach foregrounds designing and implementing for qualities that artists value as part of their creative process, and considers the role that tools for modelling 3D human figures play in my own creative process specifically.

Given the origins of modern digital 3D modelling software in early computational line drawing tools like *Sketchpad* (Sutherland 1963) and *Sketchpad III* (Johnson 1963), and later iterations of industrial Computer-Aided Design (CAD) software, the resemblance and fidelity of modern 3D modelling to principles similar to technical drawing tools is understandable. However, as these tools have evolved a greater array of capabilities and relevancies beyond simple drawing, allowing for digital representation of complex visual material relationships, physics effects, sequential animations, and bespoke rendering techniques, the structure of the model itself remains a complex application of the same principle: a series of interconnected lines forming a continuous mesh shell. While there is a lack of publicly available, specific data focused on what novice or casual users, creative and otherwise, find difficult about using digital 3D modelling software systems, that users *do* experience difficulty when using these systems provides the stated impetus for many research projects into novice-friendly 3D modelling systems (Funkhouser et al. 2004; Chaudhuri and Koltun 2010; Xie et al. 2013; Chaudhuri et al. 2013, for example).

A commonality shared between much of the research into creating usable software for inexperienced users of 3D modelling systems is separation between the user and direct interaction with the mesh structure itself, in favour of GUI-based interaction (Chaudhuri et al. 2013), parts-based assemblage (Funkhouser et al. 2004; Murakawa et al. 2006), or similar or hybrid solutions of the two. While this is a neat solution to the complexity of orienting individual vertices in 3D space, this does not allow the artist a great deal of flexibility in creating bespoke digital objects, nor does such a solution seek to connect the functions of such a tool to simpler potential analogues in art practice. Given the

preferences the interviewed artists expressed for certain material and interactive qualities over others when working in physical 3D materials, a brief exploration of whether a more direct mimicry of material qualities from, for example, clay, might provide a more easily usable and understandable system for modelling 3D human figures might prove beneficial. Clay is a particularly interesting material with which to compare a potential 3D modelling system and its digital material, since clay and similarly tactile synthetic modelling compounds are culturally considered approachable to many children and adults. Though mastery of clay and ceramic arts certainly requires dedicated time, a particular skillset, and expert knowledge, those same qualities are not a prerequisite for successful and pleasurable interaction with the material.

Software tools for digital 2D artistic creation, such as drawing, painting, and photography, have, in many instances, successfully incorporated common affordances and qualities of these physical materials which make them approachable for beginners of various ages and abilities, leading to greater flexibility for a range of artistic applications; the same cannot be said of programs for digital 3D modelling and sculpting. So-called 'free sculpting' is an option that 3D modelling programs, including Blender, Maya, and others, already offer, though similarity of such functions to sculpting with clay or other physical materials is not the explicit purpose of this functionality. Indeed, drawing on analogous physical processes of creation may not always be beneficial in creating easily understandable, low-threshold digital tools; though sculpting with clay by hand is a relatively familiar experience for many people, sculpting metal, wood, or stone by hand is a procedurally different process and requires specialised training, making such processes less useful as interaction metaphors. Through exploring the possibilities of mimicking the malleability and forgiving qualities of clay and clay-like substances in a virtual setting, the first approach to a redesign of digital 3D modelling would seek to simplify the digital 3D modelling process by providing the same experience in a digital format.

However, the experience of using a particular material is dependent not only on the qualities of the material itself but on the interactive (and, perhaps, affective, though the authors do not address this directly) relationship between the artist and the material, an experience that sculpting using a mouse or trackpad on a computer screen does not replicate (Klemmer, Hartmann, and Takayama 2006). The experiential aspects of modelling with clay which make it so uniquely approachable, such as its responsiveness to direct manipulation with the hands and other objects, are in contrast with modelling in digital 3D using a computer, where the artist uses a mouse to manoeuvre and manipulate a 3D object on a 2D screen. While drawing on a piece of paper using a pen and drawing on a computer using a mouse, stylus or finger are different in terms of the physical effects of paper and ink quality, the comparative reversibility of digital drawing, and the visible influence of physical pressure on the drawing implement, among other details, the experience of manoeuvring an object to draw (more or less) directly on a surface remains in each case. Likewise, though many aspects of darkroom photography, from the physical processes of enlarger printing and analogue chemical development to

removing dust spots on finished photographs by hand using brushes or toothpicks and specialised inks, are significantly changed in their digital incarnations, the similarity of adjusting analogue and digital exposures or colour values numerically, or using the cursor to find and correct dust spots on a 2D digital image, are straightforwardly analogous to one another. The experiential and practical aspects of 3D digital space as represented on a 2D surface creates a unique remove for the artist, which complicates the process of creating a similarly analogous space for 3D modelling. Additionally, while many people have experience of using 2D digital drawing tools in non-specialist contexts, like colouring apps or social media tools which allow the user to draw on the screen to create an image, digital 3D modelling tools remain specialised, with fewer casual opportunities for non-experts to become familiar with their spatial limits and quirks.

Equally, the question of the transferability of working with a clay-like material, with its tactile squishiness, easy malleability, and tendency toward rounded forms, to the material qualities of digital 3D modelling, with its geometric lines and vertices and shell-like structure, remains. It is possible that a digital 3D modelling tool could approximate a material response similar to that of clay for artist users, but doing so would involve obscuring the 3D mesh's unique material qualities and affordances to provide such an experience. Indeed, Pixologic's Sculptris software does seek explicitly to replicate the experience of clay modelling digitally, which they have achieved through very high vertex-count models, which require significant processing power at the level of detail required to model a more or less realistic human figure. Though VR provides capabilities for 3D painting and sculpting with applications like Google's Tilt Brush and Oculus's Medium, these materials, tools, and interactions also remain distinct, relying on bespoke hardware in order to move familiar experiences and actions into a digital context. While considering alternative ways of representing 3D digital objects beyond the currently ubiquitous mesh-based paradigm presents interesting questions and issues for further research inquiry, such a project would likely represent a research project in itself, and would not address questions concerning the modelling or representation of 3D human bodies directly, as this work does.

Though the data gathered from the interviewed artists indeed suggests that particular qualities of physical materials result in artists engaging those materials, the data ultimately reveals a pattern of artists choosing materials based on characteristics or affordances of their materiality, whether in terms of aesthetic qualities, conceptual representational utility in communicating a particular idea, ease of use, qualities of interactivity, and/or social or financial availability, among others. In all of these senses, digital tools, and digital 3D modelling specifically, also have their own discrete materiality, dependent on the code and calculations from which they are assembled and the hardware on which they are displayed (Paul 2015, 2). The cost, facilities, space, technology, and skills required to produce and store a physical ceramic object made by hand versus a digital 3D model of a visually identical object differ significantly, as do the aesthetic qualities, cultural associations, and visual cues communicated to the viewer by a ceramic object versus a projected or screen-based digital image. This suggests that artists

who use digital 3D models in their work likely have similar reasons for using this material in particular, informed by the qualities of the material, the tools and environments available to them and the concepts they seek to communicate when making their work.

The second approach considered was to create a system which would take a physical 2D or 3D object created by an artist and generate a digital 3D model based on the original art object. Similar ideas and variations on this approach have been used in prior academic research, including Rivers et al.'s *Sculpting by Numbers*, which describes their process for creating digital 3D models of physical sculptures (Rivers, Adams, and Durand 2012), and Kraevoy et al.'s *Modeling from Contour Drawings*, which gives detail on the authors' use of contour drawings to deform and shape existing 3D models (Kraevoy, Sheffer, and Van De Panne 2009). While this option was considered primarily as a starting point for the initial figure model, rather than as a complete approach to modelling as in the research literature, concerns about the viability of requiring users to negotiate additional hardware in order to use a basic feature of the tool effectively led to deprioritising this avenue of investigation in the initial prototype. Likewise, the qualities of interacting with a material in this multi-layered manner would similarly change the calculations the artists described making, since the experience of manipulating clay with one's hands, drawing on paper, and manipulating a figure on a screen require significant material range and dexterity, different facilities, infrastructure, and storage, in addition to being experientially different.

Instead, the focus of the prototyping process was grounded in Resnick et al.'s directive that a creative tool should have a "low threshold, high ceiling, and wide walls" (M. Resnick et al. 2005). The gap between low threshold and relatively narrow-walled tools for modelling 3D human figures, and high ceiling, high threshold general 3D modelling software, presented an opportunity for exploration around what a tool in the middle could accomplish. What could designing interaction in the space between a GUI-controlled user interface and a direct, highly-detailed individual vertex-based manipulation model look like? What kind of language would make the interactions available in such a system clear to users from a variety of creative backgrounds, while avoiding normative categorisations? What could designing tools for versatile, simple and legible interaction look like? What might be accomplished by considering the ways in which a software tool can support and contribute to creative process by designing to allow for surprise and suggestion in the creative process, as so many participants described incorporating?

On a personal level, my needs as an artist were clarified by these considerations. Though the goal of creating an approachable tool remained, it became clearer that I was using existing software tools for modelling 3D human figures during a specific phase in my process, chiefly as an initial tool for modelling figures overall before moving on to more complex mesh, material and animation design and editing processes in general 3D modelling software. Thus, the design process also accounted for creating a tool to better support my needs at this stage of my practice, while being versatile enough for

more general use. How the digital figure body itself is conceptualised in this space is of paramount importance, and aspects of representing the figure, including prioritising creativity and possibilities over adherence to a particular method of anatomical accuracy, were foregrounded as part of the design process.

4.2 The Body and Normativity: The Limits of Realism

The priority during the design of the system and its output remained focused on the representation of the body, and user experience of representing the body, in the tool. As such, the foundational set of questions concerned this representation and its congruity with the interaction design of the tool overall. The target output of the tool was originally conceived of as “realistic” models of human figures, as similar tools do,¹⁶ in line with a more expansive understanding of the shape that a human body might take, but the research process gradually problematised this assumption. Would this definition of representing ‘realistic’ bodies be confined to medically correct anatomy or representational accuracy, and of which bodies? How would this standard relate to experiential and broader phenomenological understandings of the body? Is there a way to represent a maximal number of physically possible characteristics without allowing for the representation of some bodies which are not realistic or possible? What is the utility of maintaining or aspiring to anatomical realism when representing bodies in digital space, where possibilities extend beyond the limitations of the flesh? And, ultimately, which style of representation is most relevant to my personal artistic practice and creative aims?

At the inception of this research, the mandate was to create a prototype which was similar enough to existing software tools to be competitive with such tools. This desire was based on making a prototype which had utility beyond its usefulness to my own singular artistic work. The clear gaps in representation and the ability to represent whole classes of bodies which exist physically in currently available tools was obvious, and filling this gap was a primary goal of the project. To extend these tools in a way which would allow the output of these tools to be similar seemed desirable, as the tool would be useful for producing similar results to current tools without disrupting the larger aesthetic, visual, and animation conventions 3D modelled bodies exist within. Yet, when I critically engaged with this idea of continuity as a utilitarian mandate, both in terms of the output of the system and as a priority to be integrated into its design parameters, it became increasingly clear that privileging continuity with the kind of realism conventionally used in high-detail modelling of 3D human figures as the goal (at least without balancing other concerns in tandem) would have the effect of merely extending the politics and power dynamics inherent in these conventions. Rather than uncritically extending these

¹⁶ DAZ 3D’s search results snippet text list it as a ‘realistic’ tool, while Poser 11 describes itself as a representing ‘human diversity’ (accessed 18 March 2020).

power dynamics for the sake of broad utility to an imagined user, for whom current digital aesthetic paradigms are theoretically uncomplicated, deeper questions appeared more interesting and urgent.

The areas which are most problematic in terms of representation and parameterisation within currently available software tools are those of gender, race, and physical disability. The approach taken toward these categories in the initial design phase was to either remove their parameterisation and integrate their characteristics into other parameters, or extending the design paradigm of limited parameters such that a broader anatomically correct range of human figures would be possible. The constraints of such a system were to limit specific areas of the body to more or less a range which is 'possible' in nature for each parameter, which would involve research into anatomical possibilities, and, ultimately, designating the borders of the possible and the impossible. This research would necessarily rely on medical, anthropological, and media depictions of the range of bodies which exist and are documented, with all of the implicit and explicit bias, normativity, and sensationalism of othered bodies which society reflects in these domains (ideas which are discussed by Doy 1996; Martin 1999; Butler 1993; Shildrick 2009, among others referenced in Chapter 2). While maintaining a strict relationship to norms of anatomical accuracy has advantages, particularly for the use of such figures for medical animations and teaching tools, it can also be argued that the smooth, hyper-symmetrical idealisation of the body present as a convention in 3D modelling does not, in itself, reflect a realistic depiction of the body. The creative intent of this tool and the primary necessity for it to serve this purpose, rather than that appropriate to a medical or instructional outcome, is also a factor in considering the trade-offs inherent in prioritising the mode of representation this tool would follow.

Removing parameters with problematic results or implications and incorporating them into broader but limited parameters presented several notable problems. In the first instance, leaving the broader aesthetic paradigms of representing 3D human figures intact while merely removing problematic textual references in the user interface could serve to further obscure any ongoing problematic limitations of such a system. This is similar to the way in which social science research has shown that not referencing or acknowledging gender, race, or disability as important or relevant factors in society and in interpersonal interactions tends to perpetuate inequalities by avoiding their existence (Bonilla-Silva 2006; Neville, Gallardo, and Sue 2016). Simply removing the offending language without questioning the underlying system of representation present in these tools, and in 3D digital space more generally, felt thus unlikely to either address my specific concerns or to inform the creation of a software tool which would do more than present an appearance of neutrality at the expense of rigorous engagement with bodily politics more deeply.

Furthermore, to extend limited parameters in order to incorporate a broader range of diversity, the limits of these broadened parameters would again have to be defined. Setting limits according to medical anatomical and/or representational human diversity not currently used in such 3D modelling

systems might be possible, but would also likely result in combinations of parameters which produce 3D digital bodies which do not exist in the physical world. Should action be taken in order to prevent the user from making such modifications? What level of implementation complexity would be necessary in order to exclude these possibilities? To do so would seem too similar to Bastioni et al.'s assumption that users would only apply gendered rigs to otherwise gendered 3D figure bodies in error (Bastioni, Re, and Misra 2008); such an approach presumes, ultimately, that a user of the tool's chief concern is anatomical or literal representational accuracy, and in 3D modelling, a particular stylistic representation of that accuracy, at the expense of other modes of representation. Furthermore, it precludes that representation using methods which require further technical implementation and restriction for the user, offering fewer possibilities to the user at the expense of more labour in determining which conditional possibilities meet this standard.

Such limitations would likely also have a similar normative effect on the figures they are able to produce. The study of general human anatomy, even in a medical sense, can also be argued to be normative, to the extent that it focuses on the description of average bodies at the exclusion of difference or variation (at least on more than a case-by-case basis). While averages can offer opportunities for general understanding and simplification of complex phenomena, they may be less useful in situations where specificity and detail are prioritised over general representation. Similar norms are present in guidance for figure drawing for artistic purposes. For example, seminal instructive texts for anatomical figure drawing, which remain popular today, strongly emphasise generalised gendered differences between figures, while also describing tricks and tips of exaggerated anatomy which allow drawn figures to more closely conform to the viewer's expectations (rather than the live model's anatomical characteristics) (Loomis 1943; Huston 2016, among others).

Indeed, norms of anatomy for artistic applications have shifted considerably between art historical time periods, movements, and media, and representations of the body which do not follow medical anatomical norms in myriad ways are common throughout art history. A blatant and often-cited example of this phenomenon in the Western art historical canon, Jean Dominique Ingres's orientalist *La Grande Odalisque's* (1814) elongated torso, pelvis, and spine were found by medical researchers to be of sufficient length to require five additional lumbar vertebrae, with a rotation of the pelvis which they were unable to replicate with a live model (Maigne, Chatellier, and Norlöf 2004). The same researchers posited that the artist likely represented the model in this fashion for metaphorical and conceptual effect; though art historians have more recently focused on the overt sexualised racism inherent in Ingres's depiction of the nude model as an exotified Other (Doy 1996; Macmaster and Lewis 1998; Polinska 2000), that anatomy can be expressive as well as representational has a strong background in both art historical and anatomical crossover research (Hammerschlag 2016; Lazzeri et al. 2015; Marinkovic et al. 2014; Proweller 1973; Sánchez et al. 2004, among others). The idea that anatomy and anatomical choices, particularly in an artistic context, might reflect ideas, representations, and affective

states more than strict medical accuracy is also relevant to the development of this software as a tool for artistic and creative expression.

Extrapolating from this context, this relationship might be described thusly: “In medicine anatomy is applied; in art it is transformed.” (Lee 2010, 104) A primary facet of this quality of transformation is the materiality of the media used to create art; specifically, its own advantages, affordances, challenges, and aesthetic and evocative qualities (Leona 2009). Different varieties of pencil, charcoal, paint, wood, clay, digital and analogue film video and photography, digital visual and auditory media, fibre and textiles, and other materials used in the creation of visual art have their own “active” materiality, which produces or allows for certain qualities which the artist may choose to employ, in addition to or in conversation with the content of the artwork (Ingold 2007). The body itself has its own social and physical materiality, which reify and reinforce one another continuously (Butler 1993, 37-38). We experience this materiality of the body through our own bodies and the bodies of others, which co-creates our perceptions and experiences throughout our lives, in addition to taking on an artistic materiality in a performance context. The ways in which the body is transformed through transference or representation in other media is dependent on the material itself, but also on the techniques employed by the artist.

For example, while Kehinde Wiley and Jenny Saville are both acclaimed painters working primarily in oil paint and painting human subjects, the results they achieve are markedly different. In Wiley’s naturalistic portraits, he reconfigures the established visual language and signifiers of power present in the Western art historical portrait canon in order to portray the heroism and power of young black men,¹⁷ utilising the smooth, translucent material qualities of oil paint in layers to imbue his representations of both human figures and animals with their characteristic realism. Saville, meanwhile, uses visible individual brushstrokes and thick paint, combined with moments of hyperdetailed realism to create sensory and evocative paintings primarily of women which highlight and amplify the physicality of the bodies’ flesh in all its tactility and inherent imperfection.¹⁸ These prominent contemporary artists’ skilful and divergent use of oil paint illustrates the way in which the materiality of a particular media can be utilised differently according to the artist’s conceptual, aesthetic and expressive aims.

Likewise, abstraction, and abstraction of the body in particular, has a long lineage in art and art history, as a method of communicating conceptual facets of the artwork to the viewer, and of representing various perceptual perspectives. From the hybrid figures of Hieronymus Bosch to the movement-oriented paintings of Marcel Duchamp, the humanoid sculptures of Louise Bourgeois to the disjointed

¹⁷ Paraphrased from the artist’s ‘About’ section on the artist’s website, (<https://kehindewiley.com/>) (accessed 24 March 2020).

¹⁸ Paraphrased from the Saatchi Gallery (https://www.saatchigallery.com/artists/jenny_saville.htm) and Gagosian Gallery’s (<https://gagosian.com/artists/jenny-saville/>) entries on the artist (accessed 24 March 2020).

and transitory photographic self-portraiture of Francesca Woodman, the duality of the body in Claude Calhoun's photographs to the intentionally racially stereotypical representation of Kara Walker's silhouettes, abstraction, exaggeration, and creative license with regard to the imagining of the human form have played a vital role in historic and contemporary art-making and movements. As the participants in Chapter 3's artist interviews discussed, the body can take on many roles in visual artistic work, from practitioner in the process of creation to performer to representative subject, many of them overlapping depending on the kind of work being created, further complicating the notion of a distinct and representative human subject, made by and separate from the artist. Many of these representations and practices disrupt, often intentionally, the assumed mind-body dualism of the body in post-Enlightenment society, so that the body becomes not a discrete vessel for the brain's thought, control, and domination, but something in motion and co-constructed between the two. Haraway's cyborg provides a framework for understanding another kind of consciousness, assembled through the body and its experiences and profoundly relational, rather than objective, in its subjectivity (1991).

Digital 3D modelling also clearly has both its own distinct materiality, similar to painting, photography, and other media, as a digital object made up of a series of interconnected vertices, shapes, and joints. This materiality comes with its own set of aesthetic norms and paradigms, in terms of how these qualities and affordances will be used by the artist to create objects and animate and render them (Fuchsberger, Murer, and Tscheligi 2013, 2859-2860). Although generative and abstract 3D shapes are often deformed in ways which lead to the overlapping of parallel sides of the mesh walls, or which disrupt the smoothness of the underlying mesh, generally, representational digital 3D objects tend to retain their structural integrity (or represent decomposition as it exists in the physical world) in popular forms of digital art, including animation, games, and digital fine art. These paradigms appear to be especially rigid in terms of their representation of 3D human figures and physical world scenes and objects, and tend not to expose the underlying mesh structure. Likewise, many software tools for modelling 3D human figures implicitly assume that the artist user wishes to create a smooth, normatively proportioned figure, ignoring the unique sculptural and creative possibilities of modelling in 3D and thus preventing them from doing so.

It was these sculptural and material-based approaches which rose to the surface, on closer consideration of the conceptual and aesthetic directions I was moving toward in my artistic practice. While I was able to create more abstract human figure forms using 3D modelling software, I found it challenging to disrupt the underlying paradigm of representation in these tools, or to conceptualise representation that was both human and distinctly sculptural in 3D space. I described wanting to create figures that were emotionally evocative in their sculptural forming and positioning of the body, while remaining cognisant of harmful modes of representation which tend to allegorically associate pain, negative emotion, and immorality with visible disability and deformity (this representation is discussed by Sontag

1978; Dahl 1993).¹⁹ I experimented with methods for disrupting the surface of the mesh through animation, creating rotations and movements which positioned heads moving through chests, arms rotating 360 degrees, and translucent figures appearing to melt into one another, blurring the borders of the intact figure body.

The conceptual and aesthetic questions of my artistic work during this time caused these solutions on their own to prove incomplete. The modifications that I was able to make to the figures I had created in standalone software tools were constrained again by the tools offered by 3D modelling systems and by the way in which I had taught myself to interact with these tools. Disrupting the surface of the mesh, creating proportionally significant modifications to areas of the figure body (one example could be an extremely large or small limb, or decreasing or increasing the size or angle of a particular part of the body or face), and rotating or distorting areas of the body in ways which expose the mesh structure by straining or distorting it using tools in 3D modelling systems produced results which I perceived as appearing contrived and unintentional on an individual level. Rather, it thus emerged that my most pressing need as a user was to practically question my own assumed norms and ways of working in my established practice with digital 3D modelling human figures, and that my mandate as a developer was to find a solution which would allow those aspects of the tool to balance appropriately with concerns about design, functionality and functional output.

Therefore, the design that I produced had the necessity of balancing representing a human figure in a way that retained recognisability as a human (or at least humanoid) figure with a lack of the usual restriction on the kinds of modifications that the user is able to make and the ability to create many different kinds of modifications. The challenge in producing a prototype to these specifications was twofold: in the first instance, a consideration of the measures that would be needed to retain a somewhat 'human' shape and how to define these specifications in the software tool; in the second instance, how to allow for flexibility within those specifications in order to provide a wide range of sculptural and creative possibilities to the user when creating a human figure. These concerns were considered in combination with those addressed in section 4.1; in particular, priorities and possible solutions with respect to designing for user interaction between a purely slider-based interaction model and one which would require the user to manipulate vertices of the figure mesh individually. Questions of language and labelling to be used in the design and other relevant areas of inquiry were informed by and contingent upon these formative design choices.

¹⁹ Referenced in physical notes between dated entries on 1 March and 5 April 2017; meeting records indicate a robust discussion of practice work questions as related to the thesis on 3 April 2017, with surrounding records following the chronological order of the notes.

4.3 Building Interaction Design

Creating a prototyped tool for designing 3D human figures which would address the middle ground gap in existing interaction design models necessitated an exploration of what such a middle ground might consist of, in terms of relevant literature and research in Human-Computer Interaction and Creativity Support Tools, and in terms of their application in a 3D modelling domain specifically. Shneiderman states the benefits of direct manipulation, particularly in terms of fostering a close connection between the user's actions and the outcome of their actions in terms of greater perception of control and connection to the task they are executing (Shneiderman 1997). Further exploration led to a focus on direct manipulation of larger areas of the figure body (as opposed to individual vertices), in order to strike a balance between interactive simplicity and connection between the user's actions and the results they are able to achieve when using the software tool. Though the initial method attempted for achieving this style of interaction design proved to be incompatible with the platform it was implemented on, a solution which provided a similar direct manipulation interaction model within a framework which was compatible with the requirements of the existing source code was achieved. This compromise produced a useful prototype which met the requirements of the mandate stated in the previous section, but it also necessitated certain concessions which impacted the system that was created.

In investigating a design between a slider-based interaction design model and a direct manipulation interaction design model focused on the selection, manipulation, and manoeuvring of individual vertices, inquiry was focused on previous research related to direct manipulation, creativity, and methods used in other 3D programs (human, object-specific, and general). The utility of direct manipulation systems for easy learning and mastery of software tools among a variety of users has long been well-documented (Hutchins, Hollan, and Norman 1985; Shneiderman 1997; Jacobs et al. 2017; Adam, Daoud, and Frison 2019). General 3D modelling systems already use direct manipulation as part of their interaction design models; moving individual vertices or selections or groups of vertices individually is a basic form of interaction in these systems, as is direct rotation or manipulation of the views and camera angles by which the user is able to observe the figure body. Rather, the noted overall complexity of such systems suggests that other aspects of their design, from the complications of translating digital 2D and 3D space, the unclear and domain-specific language used in GUIs of these systems, or the number of options presented to the user, sometimes in the format of multiple tiered drop down menus, are more likely to be responsible for this difficulty. Indeed, many of these design choices and implementations appear to be at odds with Nielsen's usability heuristics, which emphasise using language which is understandable to the user and presenting the options available to the user in the GUI clearly (Nielsen 1994).

What changes might a designer make to such a general system, in order to both pare it down for use for one particular set of applications (in this case, creating only 3D human figures for use in artistic work), and to reduce the number of options for the sake of coherence? The simplified designs used in existing software for modelling 3D human figures can certainly provide a couple of clues. The usability of a particular interaction within a software tool can be increased based on its continuity with affordances and material behaviour in other domains, while allowing the user to apply skills with which they may already be familiar (Gaver 1991). This might allow the user to learn to use the system more quickly; it may also allow the user to prototype multiple ideas faster and with lower stakes, affordances which can have beneficial effects on creativity in process as an artist or designer narrows down initial ideas (Dow et al. 2010). While the degree of freedom the user has in interacting with mesh objects in general 3D modelling tools is theoretically limitless within the boundaries of the program, the level of detail and precision with which manipulations within these tools are conducted might cause prototyping within these tools to feel challenging and high stakes in terms of time investment and necessity of accuracy. A tool which provides a singular simplified, guided interaction, with both boundaries and freedoms within the mandate of a system for modelling 3D human figures, could provide unique opportunities for creativity.

Simplifying the user interface toward a more singular model for interaction could also provide new opportunities for design around incorporating creative actions and terms that the user is already familiar with. This is of course applicable in the sense that direct, responsive manipulation of creative objects is widely used in a number of creative software programs, but these direct manipulations with the 3D mesh material can also be considered in terms of how they mimic actions (or aspects of actions) from physical creative practice in a digital environment. Currently available modifications might be adapted to better reflect a similar creative style of action, in addition to being broadened to represent a more expansive range of bodies, figures, and types of figure representation. The artist interviews examined in Chapter 3 explore descriptive language which those creative practitioners found important, understandable, and meaningful to explain and describe various aspects of their physical practice. Combining these lingual references with specific and congruous techniques for modifying a 3D figure body, in a way which could be generalised to similar kinds of interaction, represented a priority.

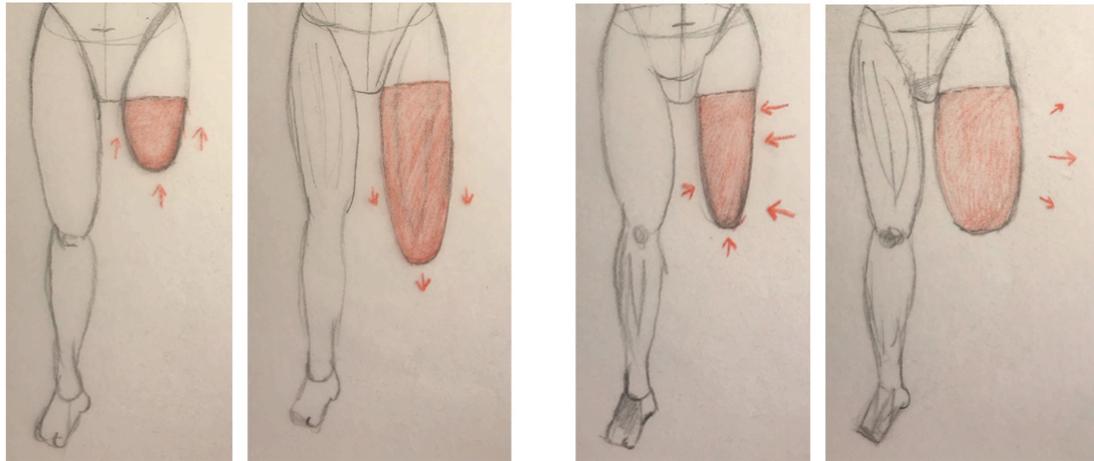


Figure 12: Initial interaction sketches, showing the upper leg of a figure body becoming shorter when the cursor is dragged vertically upward toward the body torso (left), and longer when the cursor is dragged vertically downward and away from the body (centre left); smaller when the cursor is dragged horizontally inward toward the centre of the body (centre right) and larger when the cursor is dragged horizontally outward and away from the body (right)

With these ideas in mind, the interaction design paradigm which was implemented was one where the user would be able to drag areas of the mesh dynamically to adjust the size, shape, and details of the figure body. To allow for a variety of types of interaction and manipulations of the figure mesh that the user might wish to make, the manipulations available to the user would be grouped according to similarities in their effects on the figure body, the groupings of which would become particular ‘tools’. These tools would be assessed, grouped, and labelled using the action words taken from the artist interview studies, and the direction in which the active area of the figure body must be dragged would vary according to the tool and the logic of the desired modification and area of the figure body. For example, to make a figure’s leg longer, it might be most intuitive to drag the area of the arm one wishes to manipulate downward to lengthen it (Figure 12, left image pair), but if one wishes to make the leg wider or rounder, it would be most intuitive and direct to drag the area in a more horizontal direction (Figure 12, right image pair). Thus, data about the location and movement of the mouse would be used to calculate the change in position for the affected vertices, creating a flexible system for modelling 3D human figures which would not depend on a fixed range parameter to restrict the user’s interaction with the tool.

Technically, creating such a system appeared straightforward, and there are ample examples of how to transform the vertices of a mesh object according to mathematical protocols.²⁰ Affecting a limited area of the figure mesh would involve identifying which vertex was closest to the cursor when the mouse

²⁰ Daniel Schiffman discusses vertex transformation in Chapter 1: Vectors of *The Nature of Code* (2012) (<https://natureofcode.com/book/chapter-1-vectors/>; accessed 14 April 2020). Similarly, Joshua Noble’s *Programming Interactivity* (2012) covers this topic in Chapter 13: Graphics and OpenGL; specifically, pages 503-506 discuss vertex translation for transformation of 3D objects. Comparable tutorials in this vein are available online.

was pressed, and choosing an appropriate radius around that clicked vertex which would be transformed by the dragging movement of the cursor. The distance the cursor is moved would determine the size or degree of the modification applied, and the tool the user selected would determine the manner in which the affected area would be transformed (making the radius of a limb or the torso wider, for one example, would necessitate use of a different ‘tool’ than one might use for making an area longer or applying a particular effect to the surface). The number of local affected vertices could also be varied according to the desires of the user, in a similar manner to the adjustable brush sizes available in many 2D creative software programs. Likewise, tools might require different protocols in terms of the range of available ‘brush sizes’ for affected area, since making one side of the figure body (or smaller area of the figure body) wider or larger might prove easier for users to manage coherently at fine levels of detail than making them longer or taller at scale.

Unfortunately, implementing this system using MakeHuman’s code base was not straightforward. Initial attempts to identify and reference individual vertex points for use were unsuccessful, and though the organisational complexity of the code obscured the underlying issue and facilitated numerous attempts toward solutions for placing relevant code within the program, it was ultimately clear that it would not be possible to reference the mesh and its vertices directly. This is because the speed and stability of MakeHuman is reliant on using a proxy mesh²¹ to display the figure mesh to the user in program; the user’s changes are applied to the proxy mesh in real time, but are not applied to the high detail mesh, which is not visible until the mesh is saved and exported. The vertices of that proxy mesh are never referenced directly by the program, which uses morph targets (defined positions of the relevant mesh area vertices) in order to deform the mesh when the sliders are in use. Reconfiguring the basic functions of the program might in theory be possible, but would have proved time-consuming and extremely challenging, given both my skillset, which is suited to display graphics programming, and the nature of this project as a solo endeavour. While other solutions for the prototyping of such interaction and the development of such a tool are available, trade-offs included an inability to export the figures created within the program, thus rendering them useless for my own creative practice (in standalone development tools and game engines, primarily), and similar restrictions to access to localised vertices in developing plugins for 3D modelling tools. As such, after considering alternative platforms and returning to MakeHuman without finding a suitable solution, the goal became to adapt the capabilities of the system to suit the proposed design as much as would be possible.

Other examples of interaction design in this domain from games, and one game in particular, provided significant insight during this process. *The Sims 4* (2014), an iteration of a popular life simulation game series, incorporates direct manipulation into its character creation interface (CCI). Users are able to pick pre-set features of the figure body from a library-style catalogue, then drag these body parts and facial features in order to make them larger or smaller; active areas are marked by hotspots which light

²¹ A lower detail version of a higher quality underlying mesh.

up as the player drags the cursor over the area. While the range within which the player is able to drag and resize the character's features is limited, the ability to resize individual areas of the body might allow the player to feel a greater connection between their actions and the characters they are creating. There is also a small body of evidence suggesting that particular demographics of players (in this instance, LGBTQ+ players) enjoy using this system particularly and may even prefer it to other comparable CCIs (A. Cole, Barker, and Zammit 2017a, 2017b).

Further explanation of the technical design of this CCI were presented in a talk titled 'Innovation in the Sims 4 Character Creator', delivered by Sri Nair of EA Games at the 2015 Game Developers' Conference (GDC). The section of this talk which focused on manipulating the figure body revealed that this system uses the change in cursor position to interpolate between a minimum and maximum set of vertex positions²² for the affected area of the character body (Nair 2016).²³ Different morph targets for selected areas are activated based on which designated body part or group the clicked area of the body belongs to, and these areas are mapped to the underlying mesh. Since this is also the mechanism by which MakeHuman and other slider-based systems for making 3D human figures work, using the location of the slider handle instead of that of the cursor to determine the position of the affected vertices between the minimum and maximum positions, a direct manipulation application of the same principle was instructive in practice.

However, the direct manipulations used in *The Sims 4*'s CCI are also range-limited; the player is only able to expand and compress areas of their avatar to a fixed minimum or maximum point. The flexibility of the design which I had intended to use was still an integral part of the concept for this research, and without that flexibility, the usefulness of the tool for my own practice and for the purpose of answering the research questions of the project would be less clear. When considering potential methods for extending or expanding the limits of a system based on interpolating between (and beyond) fixed morph target values, Poser 11's dial system proved conceptually relevant. An open-ended slider system which allows for theoretically infinite expansion and contraction of the figure mesh, and which uses morph targets as guides for transformation, could plausibly provide the expanded flexibility intended here, while allowing the use of the existing MakeHuman framework effectively to achieve that end.

For all of these reasons, the interaction design of this system was designed around an open-ended, interpolative model with two to three morph targets per modification used as guides for transforming the location of the affected vertices, and in turn, modifying specific areas of the figure body. These modifications would remain grouped according to the similarities in their changes to and effect on the figure mesh, and assigned as tools based on action words used by practitioner artists in the artist interview series to describe actions achieving similar results in their own artistic work. This solution

²² These sets of baked in vertex positions for a particular area are also commonly known as morph targets.

²³ This information is delivered between 06:13 and 11:37 of the YouTube video time code.

allowed for modification, addition, and expansion of the possible modifications within a system for modelling 3D human figures, and for removal of modification possibilities which were not useful, or which did not serve the conceptual, interactive, or practical purposes outlined previously in this chapter.

4.5 The Design

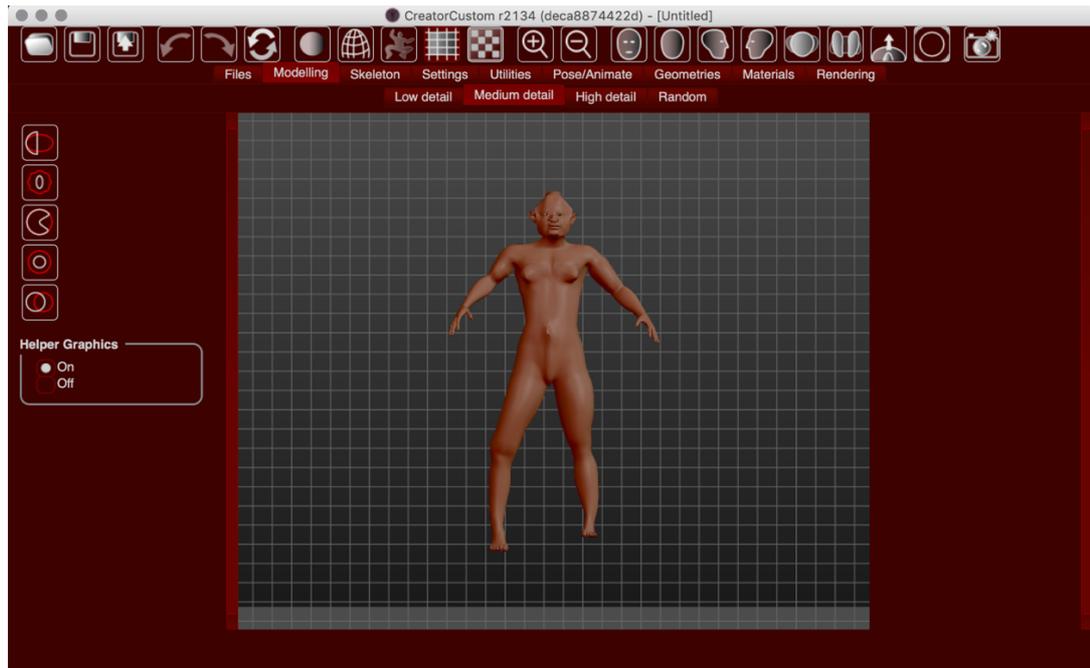


Figure 13: The CreatorCustom home screen on launch

The prototyped software tool created for this research, CreatorCustom, features capabilities for modelling, the primary focus of this discussion, as well as adding skeleton rigs for animation, posing and rudimentary animation and rendering, and adding basic skins to the figure. On launch, the software tool loads to a 3D human figure which is randomised along all available modifier morph targets to create a wide variety of unexpected starting points for the user. Across the top of the home screen (Figure 13), a toolbar includes a variety of basic functionalities, namely: buttons for opening, saving, and exporting figure files (the first, second, and third buttons from the left side of the screen, respectively), and various functions for interacting with the figure, including the undo and redo buttons (fourth and fifth from left), the option to reset the figure through randomising its characteristics again (sixth from left), options for changing and resetting elements of the display of the figure (seventh through eleventh from left), zooming in and out (tenth and eleventh from right), rotating the figure and resetting its position (second to ninth from right), and taking a screenshot of the scene (first from right). Below the toolbar, tabs for navigating between different task areas within CreatorCustom are

visible, with the default area set to 'Modelling', the area which allows direct interaction with the figure mesh; any further differentiation available in the tool is delineated by a second tabbed menu present under the first and above the figure view area in the centre of the screen. The Modelling task area is divided into Low, Medium, and High detail areas, which allow the user to manipulate the figure mesh at relevant levels of detail, and a vertical toolbar is available on the left side of the screen, with the five tools available for interacting directly with the mesh, Push/Pull, Squeeze/Loosen, Carve/Round, Add/Collect, and Move (top to bottom), represented as buttons. Below the left side toolbar, a toggle radio button allows the user to turn the relevant explanatory graphics for which areas of the figure can be manipulated on and off at will.

Some aspects of the GUI used in the original version of MakeHuman were repurposed with significant changes in order to serve the prototyped version more effectively; in particular, the toolbar at the top of the home screen and the two-tiered, tabbed menu system present in the original design were redesigned to reflect changes to the priorities of the system and its design. An additional toolbar was added to the left side of the screen to allow the user to activate the tools for manipulating the figure mesh areas, and the Materials section was amended to include a colour picker. The icons used for GUI elements were designed, and assets and other non-essential (and often questionable) elements of the program were removed. This section will discuss the interaction design implementation, the visible interface design, and other aspects of the prototype, including affordances related to redesigning the 'refresh' functionality present in the original source code and changing the figure model's material colour, among others. The section will bring together many of the concepts, concerns, and ideas raised in previous sections of this chapter, and offer a practical explanation of their application in the design. This discussion will focus on descriptive and, where relevant, mathematical explanations of the design and its features, rather than relying on an in-depth discussion of the Python code itself and the decisions that contributed to its writing.

4.5.1 The Interaction Design

Implementing an interaction model predicated on interpolation between morph targets and direct manipulation of the mesh in real time required the identification of the location of the cursor when it was clicked by the user. The ability of direct manipulation to create and facilitate a closer relationship between the user's actions and the results achieved in program is an advantage of using such a design, and also may benefit usability and ease of use of a particular tool (Shneiderman 1997). This design, to allow the user to drag the figure mesh itself according to active areas and achieve results in real time, was implemented to capitalise on and expand the existing slider-based system to the advantage of the new prototype. The slider system originally implemented worked by returning a value between 0.0 and 1.0, based on the location of the slider handle between the minimum and maximum ends of the slider.

In order to adapt this to a direct manipulation system, the value of the cursor was substituted for the 'slider' value using the formula

$$t = b_1 + \frac{(s-a_1)(b_2-b_1)}{(a_2-a_1)}$$

to convert a range of the cursor's value in relation to the figure body (a_1 and a_2 as the minimum and maximum values, respectively) to the range of the slider (0.0 and 1.0 as b_1 and b_2 , respectively), according to the slope value (s) which resulted in appropriate scaling with the cursor, resulting in t as the new 'slider' value. The minimum and maximum restrictions on the value present elsewhere in the code were then removed, allowing for values beyond that 0.0 to 1.0 range, and the screen was divided into four quadrants along the figure body, which, in addition to indicator values attached to the modifier, determined the direction in which the figure value would increase or decrease. In cases where the value needed to be reversed, such as for adjusting the overall height of the figure where the y value of the cursor would become smaller as the figure becomes taller, I used the same equation to reverse the value appropriately.

This solution, though useful and ultimately workable, required trade-offs in terms of scaling and update frequency. Since the actual vertices of the mesh were not following the cursor directly, the expansion and contraction of the mesh had to be scaled in order to mimic the movement of the cursor as such. Given that the mesh was, in this instance, to scale as far as the user was willing to manipulate it, taking advantage of this aspect of its materiality, scaling the singular value in such a way that it would follow the cursor consistently at all times was not feasible. Thus, it was necessary to devise a range within which the cursor would follow consistently, with some falloff and inconsistent scaling of the mesh outside of that area. Another problem with the interaction design in practice became apparent during the implementation process, when the contrast between the function and output of a GUI slider and an open-ended direct manipulation hijacking of the slider function was highlighted. A range-limited GUI slider is able to record changing values and update the value of the mesh between two morph targets accordingly in real time, at least to the extent that it appears so for the user, because the only possible manipulation values are those available between 0.0 and 1.0, which are returned directly. By contrast, substituting a value calculated based on cursor positioning, which is scaled according to the previous value of the modifier when it was last used (in order to prevent the mesh 'jumping' to a 'default' position to begin each modification, thus limiting the user's available modification of the mesh), returns a broader range of values with greater possible rates of change between them. Update calls were increased in order to keep the position of the mesh as current as possible to the cursor position, but the advantages and conceptual need within this system for theoretically limitless expansion and contraction of the mesh were at odds with the necessity Nielsen (1994a) describes of providing constant and consistent feedback to the user as a foundational usability heuristic. The mesh provided feedback consistent with the user's actions within a range close to the figure body, but the lag in the

appreciable rate of change in the mesh, particularly for significant modifications, was not ultimately able to be entirely resolved.

4.5.2 The Data and Assets

While many assets included in the original release of MakeHuman, including clothes, hairstyles, and material ‘skins’ provided useful options for users of the MakeHuman software, particularly novice users, such assets also were gender-restricted, racially normative, and in the case of the clothing in particular, unvaried and basic. Given these factors, these assets were removed, leaving only several basic skeleton options and an abridged section of previously available eye colours. However, the morph targets themselves, also original assets of the program, presented issues. Certain problems related to normativity in the tool, like the aggressive symmetry of body modelling tools or the limiting of body parts to normative ranges, were solvable by extending the range available to the user. Others required editing in order to expand the range of usefulness they were able to provide, or were removed entirely because they did not provide useful, unique, or extendable modifications in context of the goals of this system.

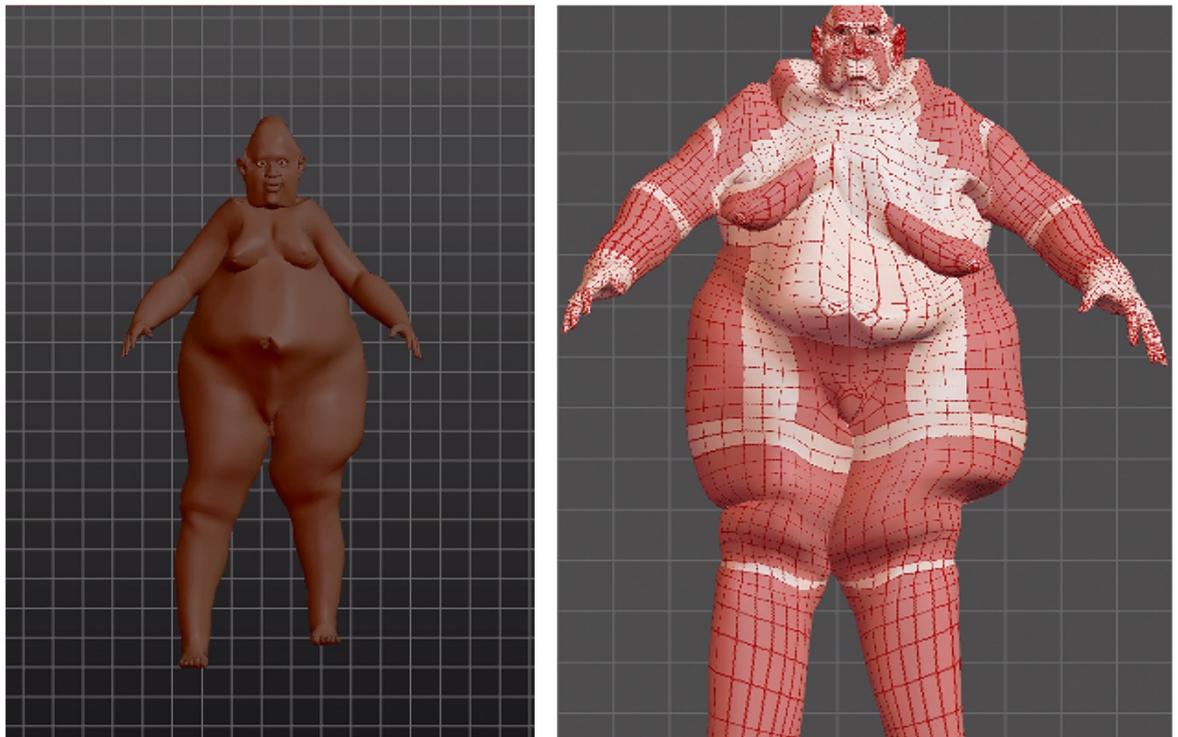


Figure 14: Randomised and manually manipulated outcomes of the adjusted body size modifiers, with a ‘natural skin tone on the left, and with the in-program ‘Helper Graphics’ showing active areas on the right

One example of a set of morph targets which were edited in order to provide more useful modifications are the overall weight and size targets for the figure body (two examples of which are shown in Figure 14). While the original morph targets included a limited range of sizes for the figure, they did not allow for fatness in the figure body past a certain threshold, and generally allowed the user to manipulate the mesh to a smooth and small expression of fatness which excludes a broad range of bodies. In order to disrupt this paradigm, the upper and lower limits of the target were edited to represent a figure body with rolls and unsmooth surface characteristics similar to cellulite and other characteristics of adult skin. These characteristics were also edited on many of the morph targets for distinct areas of the body and their size. For another example, the limb morph targets were reshaped to set the minimum target to cause the limb to disappear, so as to design the morph targets with a figure with fewer than four limbs in mind. Additionally, several morph target categories were added in order to facilitate the usefulness of the tool for my own artistic work, including to shape the groin area in a more realistically vulvic fashion, and to shape the available genitalia so as to achieve more nuanced results.

The approach used in order to create a system for modelling the genitalia in particular was informed by research into the similarities and commonalities between penises and vulvas, which are culturally represented as opposite (and oppositional) body parts without commonality (this oppositional construction of human bodies and genitalia is discussed by Butler 1993, 50-52). The MakeHuman source material included two morph targets for the length and width of the penis, and one for the testicles, neither of which were available to the user unless the figure was gendered male. Contemporary research has revealed neurovascular similarities and development parallels between clitoral and penile structures (Baskin et al. 2018; Cunha et al. 2020). This concept provides an interesting avenue by which to explore creating a system of representation which would reference and materialise this connection directly. To achieve this, the range and number of options for modification to length, width, and rotation of the shaft were expanded, and both width and length morph targets to the testicles were added, allowing them to fulfil some of the labial detail of a vulva-centred design. While further detail and precision of this system could be developed, in large part by adding additional vertices to the mesh in order to facilitate this detail, the initial prototyped version shows promise and a path forward for alternative modes of representation in this domain.

4.5.3 The Tool Functions for Modelling

After needed adjustments to the morph target categories in order to create a more appropriate system of adjustments were made, the morph targets were categorised into five discrete tools: Push/Pull, Squeeze/Loosen, Carve/Round, Add/Collect, and Move. This categorisation was achieved by going through the effects of all morph targets individually and grouping them according to the verbs collated in the previous chapter. Once this process was completed, repetitive phrasing was eliminated and

choosing wording which would most clearly differentiate the categories from one another was prioritised. However, because of the nature of each modifier having a minimum and maximum morph target, in many cases, two or more different verbs applied to the abilities of the system in many cases. For an example of this, one could imagine the targets representing the smaller and larger guides for an appendage on the figure, like the arm, might represent very different effects; in the case of the smaller, 'pressing' or 'squeezing' might best represent the effect of the action on the figure body, whereas the larger would be 'rounding' or 'loosening' in this context.

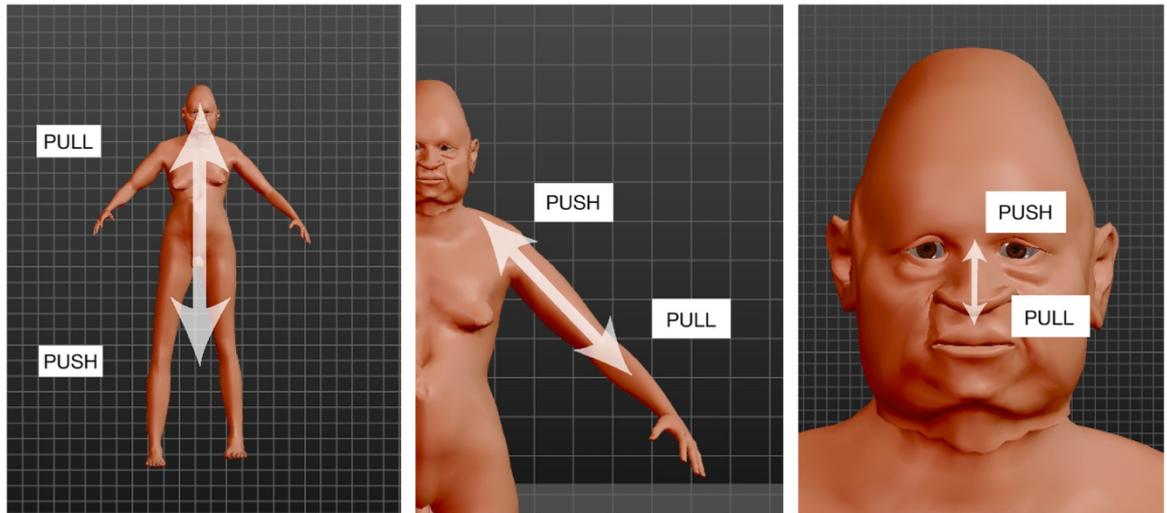


Figure 15: A diagram of the Push-Pull tool at Low, Medium, and High detail levels (left to right), where 'Push' represents the direction of the cursor downward or inward to reduce the body size or body part, and 'Pull' represents the direction of the cursor upward in the first instance and downward in the second two instances, in order to lengthen the body or body part

Gaver (1991) emphasises the advantages of referencing parallel affordances in the physical world when designing affordances for software tools in allowing for clarity and ease of use by enabling users to reference skills they already have. In order to accurately represent a dynamic where different motions could have different effects based on the direction and relationship of the action to the figure (as in physical interactions), and to attempt to bridge the gap between the two modes of interaction used to create this approach, each tool was labelled with two words, representing the spectrum of interaction which was available to the user depending on the direction of the action they took when using the tool (for example, Push and Pull). The tools were then categorised into three detail groups based on the level of detail they allow the user to access, so that a user might be able to decide whether they want the modifier to affect the full figure body (Low Detail), a section of the figure body such as a part of the torso or an appendage (Medium Detail) or small and specific areas (High Detail) (Figure 15). This idea was also inspired by the participant artists, particularly Sadie, who described working on larger areas and up to small details, and taking an idea from a rough 'skeleton' and going deeper over time, which was described similarly by several participants. This allowed for multiple clear, coherent, and

separate active areas of the figure mesh depending on the detail category that the user selects, without those categories overlapping or interfering with one another. Providing shortcuts and categorising available actions coherently is an important principle in designing for the usability of a software tool, as discussed in previous research (Nielsen 1994).

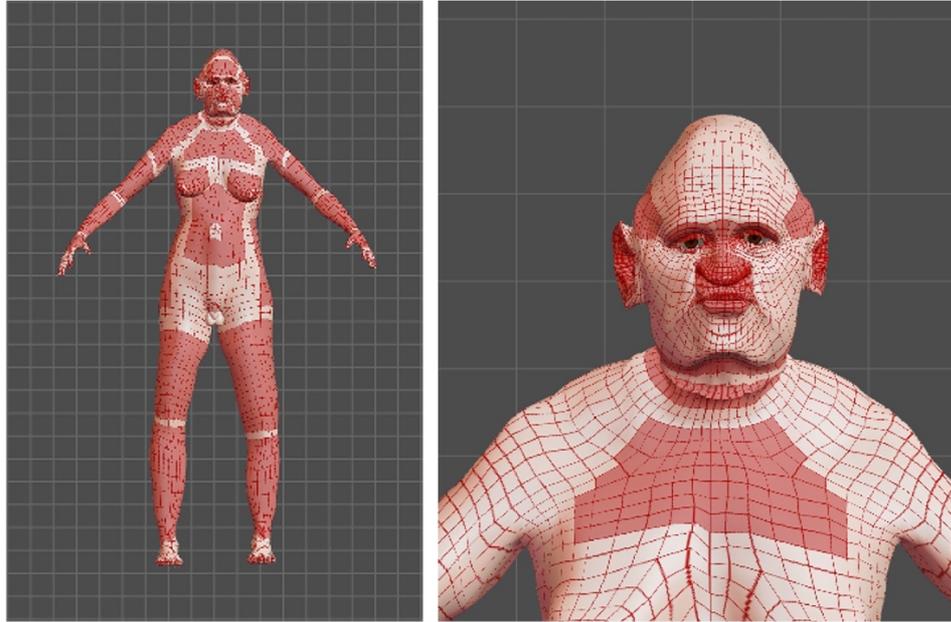


Figure 16: Examples of the 'Helper Graphics' maps of active (red) and inactive (white) figure body areas for tools

As such, the intent of the detail separation was to break down the levels of manipulation of the figure to the user in a way which would increase their perception of the affordances available to them according to continuity with established communication conventions of similar software and those within the system itself. Both Norman (1999) and Nielsen (1994a) emphasise the importance and benefits of this continuity in assessing the usability of a particular system and designing for ease of mastery for users interacting with the software tool. One of these conventions across multiple domains is that of showing active or manipulatable areas of the mesh on the mesh itself, and so the tool includes a map of active areas of the figure for each tool category (Figure 16), so that the user might be able to consider how to edit the figure based on what was available to them. In this map, the white areas of the figure are inactive, while the red areas are active when the user engages them by clicking and dragging the cursor within their boundaries.

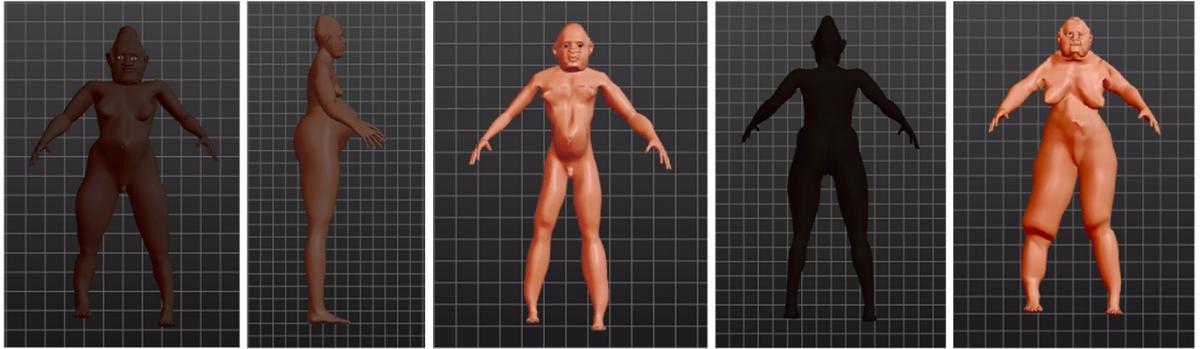


Figure 17: Examples of outcomes presented to the user on start via the randomised start function

The five tool functions themselves are not the only way to manipulate the figure within the software tool. The preference for surprise and unexpected results, particularly in the exploratory stage of practice, which was described by participants in the artist interviews in Chapter 3, was incorporated into the design of the starting point of the tool, with tendencies toward particular characteristics of size, gender, race, and disability which other systems exclude (Figure 17). MakeHuman's original system included a function to randomise the figure body, but it was included as a category of modification in the tabs of the user interface, and only included certain parameters, which the user was able to adjust at will. Instead, this model was adapted to randomise all available modifiers, in order to create a system which tends toward physical characteristics which are underrepresented in the standard digital figure modelling software tools. This system also took the place of the 'refresh' functionality in the designed tool; rather than build a tool which began each session by presenting the user with the same 'neutral' figure with which to model, they would be confronted with a more complex and surprising concept on which to base their creation. This lack of the standard starting point used in other tools allows the tool to suggest possibilities to the user that they might not have considered, in terms of body shapes, features, and specific details, and makes it more difficult for the user to opt out of these suggestions by reverting to the defaulted norm.

4.5.4 The Material 'Skin'

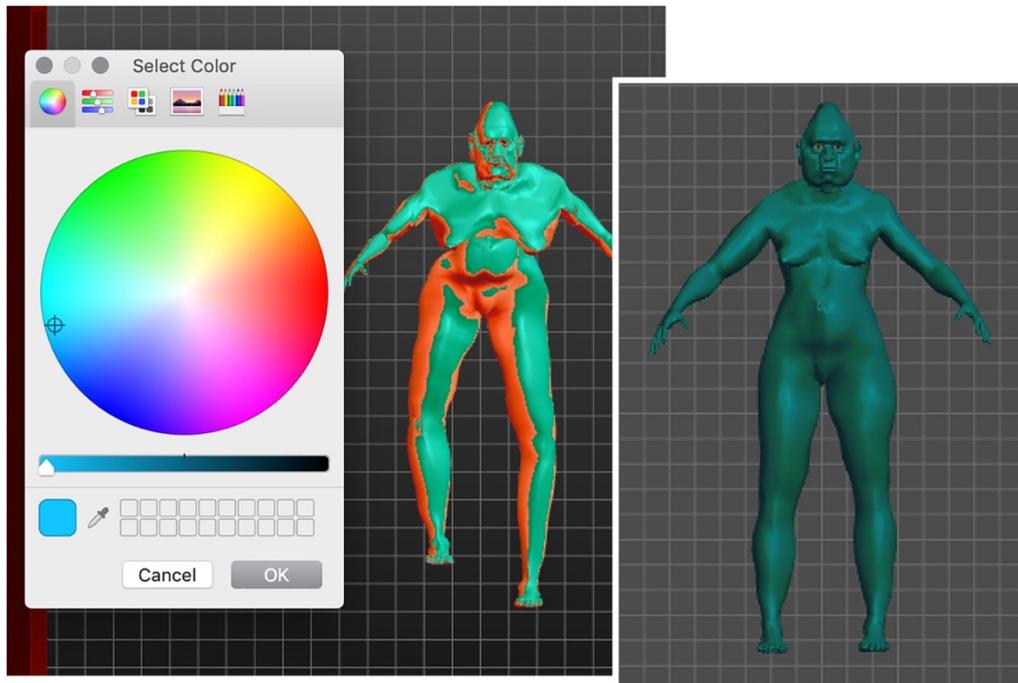


Figure 18: The colour picker in CreatorCustom and its material results

Likewise, while the figure material colour is randomised within a broadly skin-coloured range, the tool also gives the user an even broader range of choices for the material colour of the figure that they are able to design in the software. The original system provided the user in MakeHuman with a catalogue library of a series of slightly different skin colour, gender, and age 'skin' combinations for a child, young adult, and older adult skin for each of the supposed three racial categories and two genders. Several approaches to disrupting this system and achieving a more expansive range of possibilities in this particular area were explored, including adding a more variable range of skin colours to a library-style catalogue system, or a tone-limited colour picker, among other ideas. However, the benefits of providing the most flexible possible range of options to the user within the constraints of an in-program system have been noted in context of developing creativity support tools (M. Resnick et al. 2005). Bearing this in mind, I ultimately chose a colour picker, which is unrestricted and creates a diffuse texture using the colour that the user selects (Figure 18). Once the user chooses a colour, the user can name their new material, and the colour is applied and converted into a standard material file, according to the specifications of the software tool and file format, so that the user is able to create unique material colours and use them across multiple figures.

4.5.5 The Camera Views and User Interface

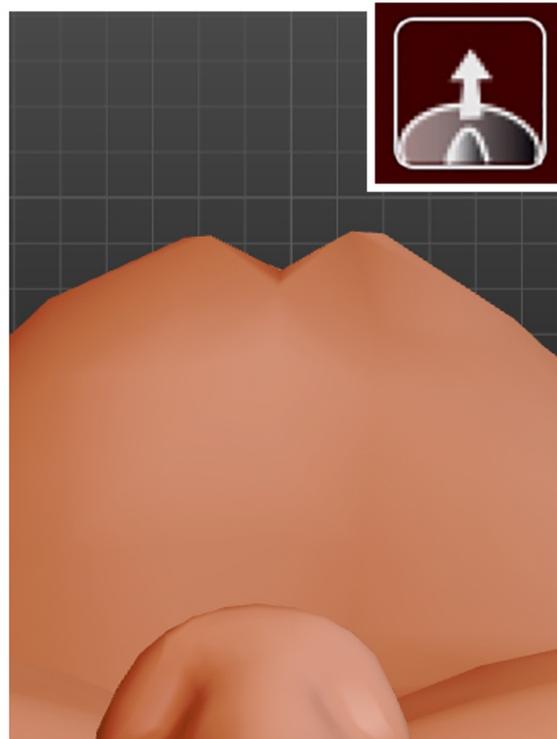


Figure 19: The Point of View button (top right, inset) and the perspective it affords the user

Finally, the GUI of the software tool was redesigned in order to appropriately reflect the system in its updated form (for a full view, see Figure 13), and several smaller additions were made, reflecting the data gathered during the artist interviews in Chapter 3. The artists discussed their bodies, in the context of performance, as simultaneously practitioner, material, and subject, and this influenced the view of the body which is reflected in the software tool. Since 3D digital human figures can represent digital embodiment and artistic subjects simultaneously, the addition of a Point-of-View (PoV) button was introduced into the top toolbar, which moved the camera to a perspective view of the digital figure (Figure 19). This figure camera view represents what the figure might 'see' if the body were viewed from its perspective, allowing the artist to consider the figure as a site of digitally embodied experience in a new way. The addition of this camera necessitated the design of a button which would accurately represent its capabilities. Ultimately, a design was chosen which was visually similar to the other figure camera view buttons, but depicted the close up nose and stomach outlines which commonly appear when the user activates this view, as well as an arrow to indicate the direction of the view and to further contextualise the shapes.



Figure 20: The tool buttons in Creator Custom, from left to right: Push-Pull, Squeeze-Loosen, Carve-Round, Compress-Add, Move

Four of the five tools for modelling directly on the figure body represent a spectrum of actions, in a similar sense to the way in which the artists interviewed in Chapter 3 use different language to describe their actions depending upon the relationship of those actions to the object they are manipulating. While an action might be described as ‘pulling’ when moving away from the object or material, a similar movement might be described as ‘pushing’ when bringing that material toward itself. Push/Pull was used to describe and classify modifications which shorten or laterally reduce, or stretch or lengthen, respectively, areas of the figure body. Squeeze/Loosen classifies primarily modifiers which control the prominence of bone indicators and the flat smoothness of the figure’s skin in the modified area, while Carve/Round refers to the angularity and degree of muscular visibility of the modified area of the figure, or rounds the overall shape of those areas of the figure, respectively. Compress/Add deals with modifiers which control the reduction or expansion of the volumetric size of an area or feature on the body. Move, the only modifier which is not conceived of as a spectrum of movement, classifies modifiers which allow the user to change the position of various areas of the figure body, particularly limbs, as well as the head and neck.

Rather than attempt to represent the tool’s effect literally on an illustrated figure body in a way which would be understandable at an extremely reduced size and across various areas of the body, the design of the tool buttons focused on a method of design which would better represent the material characteristics of the figures, specifically, their ‘hollowness’ (Figure 20). Other programs, including MakeHuman, have represented the mesh material as a flat surface material which can be manipulated in various ways; while this is an accurate portrayal of manipulations on an individual scale when range-limited, it does less to describe the effects that a particular tool might have on the figure as an object. Based on this, the figure is represented as a pair of 2D circular shapes, similar to the structure of the figure as a mostly hollow, continuous and self-contained form, where any modifications the user makes would change the surface or manipulate the surface inward or outward toward the other side of the figure. The maximum effect is represented in red, while the minimum effect is represented in silver, thus making the spectrum of effects the user can create with a particular tool clearer. Nielsen notes the advantages for usability of maintaining similarity between functions and placement in similar software tools (Nielsen 1994); as such, the tool categories are presented on the left side of the screen, mimicking similar design patterns in other 3D modelling tools such as Blender or Maya or human-specific modelling tools (or, indeed, other general creative software tools like Adobe programs).

4.6 Conclusion

This chapter has described the processes of narrowing down initial possibilities for the design of a tool for modelling 3D human figures according to an approach which centres principles and actions emphasising user creativity, and which factors to prioritise in terms of practice and representation of the figure body in the tool's functionality and capabilities. Drawing on a foundation which seeks to allow the user a broad range of capabilities for modifying the figure by using an open-ended morph target system without restriction to a particular notion of anatomical correctness, the initial figure on which the user bases their modelling within the program is randomised to tend toward underrepresented characteristics. These aspects of CreatorCustom, among others, allow for an approach to modelling 3D human figures which focuses on relating the modelling process to creative practice more broadly, and encourages the user to explore multiple available options and consider possibilities and suggestions that they might not have considered otherwise. The potential and initial utility of the tool for my own practice and artwork was clear and exciting, allowing for new paradigms of visual and animated representation in my creative work, and, potentially, the work of other artists, too.

Chapter V Workshop Study

User testing is an integral part of developing software for use beyond strictly personal applications, identifying potential problems with the tool and giving an idea of the tool's performance, functions, and use in practice (Lazar, Feng, and Hochheiser 2010). In the case of tools for modelling 3D human figures, relatively little scholarly research has been conducted or documented concerning such tools in any sense, especially with regard to user experience and interaction. The affordances of these tools, particularly in terms of the bodies they are able to produce, have likewise not been scrutinised with emphasis on usability, creativity, or the user's experience of what they are able to create using the tool in practice. In particular, the ability of such tools to suggest alternatives, and influence the user's ideas about the figure bodies they would like to create, has not been approached previously in this domain. Would users be able to use the tool effectively in order to produce artistic work, especially work which is meaningful or interesting to them? Would the tool be usable and coherent for a broad range of users? How might users experience their interactions with such a tool, and would those experiences differ between those who had previous experience with similar tools, and those who did not? How might using such a tool interrupt normative perceptions and design processes about the body during the course of the user's interaction with the tool?

This chapter addresses the usability testing I undertook in order to answer these questions, among others, and to advance topics of creative and artistic usability with an eye to representation and the representation of human bodies in particular. The motivations of this study and the development of the study design as a series of workshops are discussed, followed by the questions participants responded to in the group interview following each workshop. The decision to include a variety of artists in this usability study, and artists with a range of experiences and familiarity with 3D modelling are also addressed. The methodology, structure, and details of the workshops are then documented in detail, and the data analysis process, from coding to collation in memo writing, is described. From that foundation, the results of the study are discussed, with participant feedback on the strengths and difficulties presented by the tool in terms of interaction design, creativity and expression, and the body. These results are discussed in terms of the possibilities the tool affords according to the materiality

present in the tool, serendipity and suggestion of new ideas to users, and the role such a tool might assume in digitally facilitating artistic practice.

5.1 Method and Study Design

The primary purpose of the study present in this chapter was to evaluate the usability of the tool, and to gain further perspective from other artists on its affordances, the experience of using the tool, and the figure bodies the tool produces. The extent to which CreatorCustom met my own needs as an artist is notable and novel, as discussed in Chapter 6, and represents a new stage in my creative work, self-representation, and process. However, the software tool was developed based primarily on my own perspective and needs as a user, and as the developer, I was uniquely able to compensate for the shortcomings and inconsistencies of the tool when using it in my practice. Achieving a broader understanding of the tool's usefulness, shortcomings, and possibilities for users other than myself for whom the tool might be a relevant or welcome addition to their artistic practices would provide more information about the utility of the strategies discussed in Chapter 4 in the tool. In particular, an insight into users' experience of direct manipulation in the tool and reaction to the interaction design choices could provide further information about the tool's ease of use, particularly for users with different levels of experience with digital media and 3D modelling. Since the tool was designed to suggest and produce non-normative representations of human bodies, any effect that the tool might have on users' perceptions of those bodies, or on their ideas when using the tool, were also of interest. Finally, data to show whether users perceived the possibilities of the tool and the models they produce when using it as different to those they might be used to seeing, whether in popular uses of digital 3D like video games and animation, or in their own use of similar tools for modelling 3D human figures, was notable for this research.

To evaluate the usability and usefulness of CreatorCustom for other artists, and their perception of the kinds of modelling and bodies the tool affords, I conducted four workshop sessions with a total of 13 artist participants working in a variety of media.²⁴ The participants were recruited through advertising posts on social media platforms, including Facebook, Twitter, and Instagram, both from my own personal accounts and the Department of Computing's Twitter account and subsequent reposts by other users on all platforms. These posts linked to an initial survey, which asked potential participants about their artistic practice, including media, concepts, and the relevance of the body to their work, which tools they had used for modelling 3D or 2D human figures, characters, or avatars in the past (if any), and some demographic information and preferences for their availability. Participants were told

²⁴ Ethical approval information for this study (Ref: EA 1328) can be found in Appendix J of this document.

in the initial posts and in the header text of the survey that they could expect to be compensated in the amount of £40.00 for their time.²⁵ This survey received 21 completed submissions over a period from mid-December 2019 to late January 2020, from which the final groups of participants for the workshops were selected based on the relevance of the body in their work, achieving a balance of participants working in different media, who had experience with similar tools, and various demographic groups, as well as availability. Participants were contacted by email, and all communication, with the minor exception of logistical information on the day of the workshops with some participants as needed, was conducted in this manner.

Given the lack of similar research about tools for modelling 3D human figures, and the relative niche status of current standalone tools for this purpose, recruiting only potential participants who were all experienced users of such tools for personal creative use would have limited both the participant pool itself and any opportunities for initial comparison between participant backgrounds and experiences. Eliciting such data from a variety of artist users for whom the body is or has been important in their practice allowed for a diversity of perspectives in an initial study. This also allowed for some degree of initial comparison between the support the tool offered participants who were experienced users of standalone tools, 3D modelling, and other interfaces with those for whom these activities were new. Having a range of participants from various backgrounds and media also allowed for the consideration of these factors and their impact on users perception of the tool. It was also important that users deal with or centre the human body in their work in some sense; while the importance of the body in their work was not evaluated, the ability to articulate the meaning and importance of the body in their work was considered compulsory for the selection process. The participants would be asked to sketch their ideas on paper first, to obtain a visual representation of their ideas before interacting with the tool, and to present their ideas before and after working with the tool, so as to understand any changes in their ideas in relationship to their use of the tool in the moment.

²⁵ The funding for these payments was provided through a successful application to the Department of Computing Postgraduate Research Fund for this purpose.

Question Number	Question
Q1	Did your idea of what you wanted to create change over the course of the session today? If so, how?
Q2	What was not included in the tool that you would find creatively or practically useful?
Q3	Which aspect of the tool did you use most and why?
Q4	Which aspects of the tool did you find difficult? Which aspects would you change?
Q5	If you've used or observed systems for modelling 3D human figures before today, what has your experience with or perception of them been? How did your experience or perception differ using this tool rather than previous tools?

Table 4: The questions asked during the group interview of each workshop session

Owing to the variety and range of experiences of the potential participants, the user tests would be run as workshop sessions, with care taken to allow for enough time for inexperienced users to explore the tool in some depth, while still keeping the length of the sessions to a broadly accessible time frame with appropriate breaks. This allowed me to present the tool to the participants at the beginning of each session, so that they would be able to ask questions in real time. Likewise, this allowed for greater control for variability in the performance of the software on different machines, and for participants to learn about the tool by watching one another. This feature was built explicitly into the workshop by having participants work together during the initial modelling session, so that they would be able to solve problems and explain their reasoning to one another in order to further familiarise themselves with the tool. A subsequent solo modelling session allowed participants to explore their own ideas more clearly, and to experience using the tool on their own. The participants were interviewed as a group at the end of the session (See Table 4 for questions), in order to allow them to relate their own ideas and experiences to those of the other participants in the group, and so as to facilitate in-depth discussion while limiting the time participants were required to spend overall. The Creativity Support Index, developed by Cherry and Latulipe (2014), in order to provide additional, was also administered in order to provide standardised quantitative context for the experiences of the users in an otherwise qualitative study.

Each workshop lasted between three and four hours, had between two and four participants, and took place in a computer lab on Goldsmiths campus, in which myself and the participants were the only people present in the room. Two sessions were on weekdays during the day, one was on a weekday evening, and one took place on a weekend during the day. Participants were welcomed, introduced to me and to one another, and given a consent form, and paid for the session in cash. After the paperwork

was completed, participants were given a short introduction to the CreatorCustom software, in which I showed, via a projection, the areas of the tool we would be using in the workshop, and we went over how to create modifications using the software, with them copying my actions after I performed them. Participants were then paired up for the partnered modelling session, and, after a break, returned for the solo modelling session. Before using the software tool to create a 3D human figure during each session, participants were asked to sketch or write down their ideas on paper for the figure they intended to create, and participants were prompted to discuss their initial ideas in relationship to the figure they created while using the software tool after each modelling session. After the second modelling session, the participants were given the initial portion of the Creativity Support Index (Cherry and Latulipe 2014) to fill out on paper. Participants were interviewed as a group about their experiences using the tool, which typically lasted between 30 and 50 minutes across sessions, and after the interviews finished, the workshop ended. Participants were emailed the same version of CreatorCustom which they used in the workshop, so that they would be able to continue using it if they wished; it is not clear that any participants used the software tool after the session ended on their own machines.

5.2 Data Collection

The group interviews were video and audio recorded, as were the presentations by participants before and after each of the two modelling sessions. During the modelling sessions, a camera on a tripod video and audio recorded the room and all of the participants, while each individual computer was screen recorded with audio, in order to capture the participants' activities in real time. Log files produced by the program were copied after each modelling session, with information about which tools were used by participants and how frequently each tool and detail category was clicked by the user. I took notes on paper during the course of each session, stopping only when I was interacting directly with participants; these notes recorded the main points of what participants were saying, and anything that felt particularly interesting for me, or raised connections between events in different sessions which I wanted to reference or return to later. The participants' sketches were kept for comparison with the human figures they created during the sessions; they were also given the option to save and take home their work. I circulated a form two weeks after the last session, asking if participants had used the software tool further on their own time, and whether they had any further feedback.

5.3 Data Analysis

The group interviews were transcribed and the transcripts were analysed and coded according to Charmaz's (2014) grounded theory method, wherein I followed an initial phase of coding in which I categorised the transcript texts line by line, and then again according to the specific questions asked during the interviews (Table 5), where the participant's responses to each question and any session-specific topics were considered across sessions, looking for commonalities and particularly interesting or unique responses. I then commenced a period of focused coding, where significant, repeated, or interesting codes were used to further analyse the data and inform larger conclusions from the data (for a full listing of the codes used to analyse the data with examples, see Appendix G). Log data from the sessions (available in Appendix F), in combination with the screen recordings, was used to identify and corroborate reports of the frequency of the participants' use of certain functions within the software tool. While the modelling sessions and short presentations of ideas and results were not transcribed, I used my notes from each session to identify significant statements or events from these parts of the workshop sessions, and coded this information with timecodes for the relevant videos into existing code groups and codes as relevant. NVivo software (QSR International 2015) was used to maintain and categorise these codes and relevant information sources from the sessions. During the period of focused coding, repeated or notable references to the randomness of the tool and the surprising or unexpected nature of the results it produces, as well as user expectations, and the bodies the tool makes, among others, were coded, as patterns emerged around these topics (see Table 6 for the child codes for unexpected or surprising results of the tool, for example). Demographic information related to previous experience with 3D modelling generally and tools for making 3D human figures, media used in their practice, as well as more traditional demographic categories like gender, race, and orientation, were also compared to relevant codes in order to assess any particular relationship between these factors. Memos were written in order to summarise the findings and to develop relevant ideas based on the coded information.

Initial Theme Codes	Example
Similarities and differences with current 3D human figure modelling systems (Q5)	So, I had very limited experience, mostly just with games, creating avatars, like quite simple stuff. And I think what was quite interesting about this system was that it felt like I recognised myself a lot more in it.
Most-used functionality (Q3)	I grabbed just the one to push and pull. Because it seemed to be that, I didn't know what the others meant actually ...
Most difficult (Q4)	Right. And also with that, to be able to know... Like often there was like, oh, this tool was working really well but I don't know what tool it is, it's not highlighted.

Creative or practical useful changes (Q2)	During the second exercise, when I was working through the side view and I got the figure to look as how I intended to look and then I went to another view and it wasn't as I expected and thought that it would be good to have a navigator for the interaction of the views. So, if I changed in one view, I could see how it changes in another.
Changes in what they're trying to make (Q1)	Well, when I came into the session from the very start, I didn't really have a set character that I wanted to make really. I was kind of just going with the flow and seeing what arose during the session and I think when we did the collaborative thing at the start, that really kind of informed what we did then in the individual thing. But then even in the individual part, my ideas of what I was doing kind of changed as I was working because of the yeah, yeah, just kind of evolved I supposed. Like I think the, when I started the individual thing I had these kind of ideas. I achieved all them I think but I think it became something a bit more interesting than I actually thought it would.

Table 5: Initial codes and example text

Unexpectedness/Child Codes	Example
Using tools because they gave expected results	because that was the one that was responding usually as to how I was expecting it to.
Unique results	Yeah, actually I agree with the randomness and I think that's the bit that you can always get this originality in... individuality, whenever you're creating a character. It just comes out never the same and you can sort of give a go and let yourself in and then give it up and then you always, yeah, have some surprises. So, it's very good.
Response	It was like the same distance and the same location, I can only think that it's like it's the centre point inside the object that I'm moving is altering it as I move it. But I just, I didn't have a point of reference as to knowing how it was changing in respect of my cursor. That it was altering the way that develops. So, that was a little difficult, that you can like, so if you could like kind of locate where it's going to be in proportion to it would help give some sort of expectation as to what's happening I think.
Modifications by accident	I really ... I honestly I couldn't get my head around what that was doing. I was ... I yeah, I tried it a couple of times. It made my model fat at one point, which I was like, wish I'd been making Tony, that would have been perfect. But this guy was supposed to be skinny, and I was like, fuck's sake.
Fun to not have too much fixed in mind	I'm just thinking about how I can make thing just whatever is unexpected or I want more control or less control and I think compared to the mainstream, all those different platforms and software, the objective of my intention is just trying to use the better part of that certain software to achieve my objectives. So if there is some unexpected thing happening that's really interesting.

Table 6: Focused codes and example text (excerpt), Unexpectedness

The participants' names have been omitted from the interview transcripts (available in Appendix D), replaced with participant numbers so as to protect their privacy. Some of the participants' artwork from the sessions has been used in this chapter, and in these instances, their artwork has been attributed to them by name, as they indicated on the consent forms they signed. However, the reader should not presume any correspondence between that artist and any participant numbers used in proximity to those artistic works, or elsewhere in the chapter. Though participants were given the opportunity to offer further feedback two weeks after the last interview, only one participant did so, in order to reiterate information shared during the interview. Owing to researcher error, the second part of the Creativity Support Index (CSI), in which participants are asked a series of repetitive comparison questions about their preferences in a creativity support tool for the activity they are completing, was not administered on the day of the workshop; however, it was sent to participants in a digital format a month after the workshop, and 11 out of 13 participants filled out this portion. As such the Creativity Support Index was scored for those 11 participants only (for full CSI scores for all participants, see Appendix E). The following section will describe these results in relevant detail, particularly as they pertain to the interests and goals of this research.

5.4 Results

The 13 artists who ultimately participated in the workshop sessions have a variety of material and conceptual practices, significances of the body in their work, previous experience with 3D modelling and human modelling tools, and come from a range of demographic groups and experiences. Their practices included painting, set design for theatrical productions, illustration, sculpture, audio, virtual reality, computational art, and performance, with conceptual topics ranging from health, personal and structural identity, immersion, cross-cultural collaboration, and queerness. The artists described interests in the body in their work based on documenting, amplifying, and exploring their own bodies and bodies like theirs, designing for the body, the expressiveness or metaphorical possibilities of the body, and the emergence of the body from abstract forms. Two participants reported using 3D modelling software regularly in their practices, while a further eight participants use 3D modelling occasionally or have in the past. Four participants reported having used video game Character Creation Interfaces to model human bodies in the past, two reported using 3D modelling software for this purpose, and two reported using standalone tools for modelling 3D human figures specifically.

In total, the participants were seven women, three men, two non-binary people, and one genderqueer person; four of the participants were reported to be straight and cisgender, with the remainder reporting some form of LGBTQ+ identity. Four participants reported making all of their income from their creative work, while four reported making no income from their creative work; the rest were

somewhere in between. While three participants reported being self-taught in their creative practice, and two more report being trained through apprenticeships, the majority of the participants had received some amount of university-level instruction in art practice, whether at the undergraduate or graduate level. Three participants were East Asian, one was South Asian, and one was Black American, with the rest being white and the majority white British. Only one participant affirmatively reported having a disability. However, the overrepresentation of university-educated, white, and abled participants may represent a shortcoming of the recruiting methods and criteria used in this study, and the results should be understood with this context in mind. The following subsections will present the results in detail, focusing on results that are particularly relevant to the concerns and research priorities of this inquiry. These results will begin with responses to specific questions asked to the participants during the workshop group interviews, and move to emergent patterns in order to add depth to this discussion of the interview data.

5.4.1 Q3: Which aspect of the tool did you use most and why?

Overwhelmingly, most participant users reported using the Push/Pull tool, either because it was an action they understood from other software tools, from the physical world, or because it was the most responsive and/or provided the most understandable, identifiable, consistent, or desirable results. Many participants found the terminology of some of the other tools difficult to understand, but the function of Push and Pull seemed to be clear for a majority of those users. P03 said, "...squeeze and loosen, like vocabulary-wise I wouldn't know, if I had a sculpture, what I would do to squeeze it or loosen it. I don't really know what that does." Squeeze/Loosen, as well as the Move tool, were mentioned in passing across sessions as particularly challenging in this sense, while Push/Pull, in particular, was generally well-understood, and perhaps thus used most often by the participants. P04 described Push/Pull as more similar to language and actions the user might take in the physical world, a sentiment echoed by P01 and P13, who referenced the use of similar terminology in software programs like SketchUp. Nielsen (1994) emphasizes the importance of a system which "speaks the user's language", while Gaver (1991) describes the advantages of connecting familiar actions from real world contexts to those available in software tools. While the users reported that Push/Pull implicitly satisfied both of these heuristics, Squeeze/Loosen in particular was less clear for the same reasons, since users struggled to connect it to contextually relevant activities or language references. Carve/Round and Add/Collect also were reported as most frequently used by P11 and P01 respectively. In these instances, these users described using those tools because they matched what they were trying to design best, in the sense of a desire for more curved lines, or for making a bigger body, among others.

P08 described using particular tools because those tools modified the area that she wanted to modify, rather than because of the tool itself or its perceived effect, particularly when using the High Detail mode to make modifications to the face of the figure. P05 reported using all of the tools in rotation, which she stated was more out of confusion about the functions of the tools and the results they achieved than the result of a particular strategy, leading her to go through all of the modifiers until she found an area that was responsive (problems with responsiveness in the software reported by the users will be discussed in more detail in 5.4.2). The randomiser was used by five participants or groups during the sessions in order to restart their modelling process multiple times, and not at all by the majority of others; several of the participants who did use it commented on it positively in the interview itself, and this seemed to be an aspect of the tool that those participants very much enjoyed. Participants P09 and P06 describing it as “so cool”, since they felt it could be used to inspire new ideas in the user and to shape what the figure became, which P09 described as the figure “telling you what it wants to become”.

Outside of the modelling tools and modifying the body itself, the users described using the camera zoom and the various views frequently; this is understandable for navigational purposes when modelling, since it enables the user to see different sides of the figure body. The participants also described using the undo function to undo their actions often, and the log files support this. While this is likely the result of being new to using the software tool, as indicated elsewhere in the interview, this is also the result of the tool not being responsive, subtle, or not doing what the participants expected in many instances. When watching and listening to the screen recordings of participants using the tool during the work sessions, most participants repeatedly followed a pattern of making modifications, not being happy with the results they achieved, deciding to undo their actions, pressing undo, trying again, and so on. Users also often had to press undo multiple times in order to revert to their original position, and would sometimes choose an intermediate stage of the modification in reversing it, perhaps because this allowed them to achieve a result more similar to the one they had originally intended (a more subtle result, in this instance, as several participants noted), or simply because they liked the result of the intermediate stage.

5.4.2 Q4: Which aspects of the tool did you find difficult?

Many users had difficulty with aspects of the naming and terminology used for the tools, as well as how they related to the function of the tool, and differentiating between different tools. The tools were designed as spectrums between two actions, depending on the direction of motion in relation to the figure, where “squeezing” would apply to an action moving inward toward the figure, and loosening that squeeze would apply to moving outward from the figure. While P05 seemed to understand this relationship intuitively and well enough to explain it to other participants, P03, who participated in the

same session, articulated strongly that this relationship was unclear for her, and both stated that the lack of responsiveness in the tool or the feeling that the tools “all did the same thing” caused confusion here. Some participants also did not understand the terminology itself and how it might be applied to modelling a 3D object, as with P03, who was confused by what it might mean to “loosen” the figure. Some users (P05, P03, and P06, particularly) also did not feel that the tools produced substantially different effects, such that it was easy for them to differentiate which tools did what, or to make a conscious choice about the tool that they were using based on that criteria. A majority of participants found it difficult to remember which tool was selected, since the tool did not stay highlighted or otherwise indicate to them which tool they were using. This was discussed in multiple sessions by many participants, with several solutions proposed by participants across sessions.

This points to a larger theme of difficulty for many participants, which P06 described as “not understanding the rules” of the tool. This concern largely related to the unpredictability and inconsistency which the participants experienced (and, at times, the researcher observed) with the interactive responsiveness of the tool. Participants described trying and failing to complete desired modifications to the figure, and feeling that certain modifications were impossible to complete in tool. The software tool often jumped, particularly when participant users dragged the mouse very quickly or without directional attention, and participants were not always able to achieve the same results when providing the system with the same input. Many participants reported that they would try the same interaction on the same area of the body with the same tool and achieve totally different results at times, and this is observable in the screen recording videos. While some participants expressed general frustration and confusion about this behaviour, particularly P10 and P05, others, particularly those with coding experience like P01 and P02, tended to attribute this behaviour and their frustration with it to a lack of feedback about the limits they assumed existed in the system.

Another sense in which participants articulated “not understanding the rules” was around the helper graphics and the way in which the active and inactive areas were delineated. Participants in the first session (P10, P11, P12, P13) did not understand that the red areas were active and the white areas were not, which contributed to confusion among those participants about which areas of the figure body they were able to modify at any given time. This was clarified after the initial modelling session, but likely contributed to their confusion in particular, and specific attention was paid to clarifying this point with participants in the introduction to the software given in subsequent sessions. Additionally, the presence of the red graphic wireframe lines on the figure was also reported as a source of confusion, since both P05 and P13 tried to use them for modelling on the figure, presuming the lines were active since they were also red. P05 in particular also struggled with feeling limited by the number of active areas available to her; she described wanting to be able to modify every area of the figure body in a set way. She also queried the inconsistency of having some symmetrical modifiers that modify both sides of the body simultaneously, and some that only modify one side; for example, modifying both hips of

the figure versus each hip independently. In terms of the granularity of detail provided by the modifiers, P10 described difficulty with the perceived lack of sensitivity of the program to fine detail modifications, and P02 articulated wanting to be able to complete finer detail modifications with more ease and subtlety.

Several participants also found that the way they were able to orient themselves in 3D space around the figure was difficult to understand or not adequate for their needs. P06 describes the experience of thinking she is modifying an area of the body in a particular way, only to discover that that modification looks quite different from another angle. P12 experienced difficulty for similar reasons in not having access to multiple views of the figure at the same time, a feature which 3D modelling software tools commonly have and which may help compensate for the difficulty in spatial understanding in modelling digital 3D on a 2D screen. P01 described the relative slowness of using the arrow keys to zoom and position the camera view, and pointed out that using the arrow keys in this manner tended to distort the camera view noticeably in certain edge-case instances, an issue that P03 also noted. P13 also noted that the relative flatness of the lighting in the program made it difficult for her to understand the geometry of the figure without the helper graphics. P05 expressed interest in using the Point of View camera view, but stated that since the granularity of the program did not seem to function consistently in higher detail contexts, she did not feel that she was able to use this view effectively in order to model.

Finally, the figure's shape and attributes were another point of difficulty for some users. P04 felt that the model was not a very "normal" shape, while P10 described the tool's model as inherently flawed, and, implicitly, presenting a difficulty to the user in that sense. P10 also stated that the inclusion of genital meshes in the tool was confusing because there wasn't enough fine detail built in to the tool to be able to modify them, and so she felt that it was "provocative for no reason" to include them. Though a desire to omit genitalia might appear to be at odds with her desire for anatomical accuracy in a tool for modelling 3D human figures, she did articulate that it was the perceived lack of functionality that she experienced when interacting with the genital mesh which led her to feel that its inclusion was a provocative or an intentional statement of some kind. While a more fulsome discussion of the users' perceptions of and experiences with the bodies that this tool makes will be discussed in 5.4.8, it is worth noting that some users experienced the style of modelling offered by the tool as a difficulty and an impediment to using the tool in order to create a figure according to their aims. P09 said, "I think what I loved about it was also what was challenging about it", in reference to the software tool's tendency to create specifically asymmetrical bodies, describing an ambivalent relationship to prioritising the usefulness of symmetry over the desirable or interesting results the tool afforded them during the session.

5.4.3 Q4: Which aspects of the tool would you change?

One question that the participants were asked explicitly as part of the group interview addressed which potential changes to the tool the participants would find creatively or practically useful. The participants provided a range of suggestions for possible changes or improvements to the tool, addressing the modelling, interaction design elements, representation of the body, and changes to 3D modelling itself. This section will discuss the participants' ideas, their advantages and disadvantages, and, where appropriate, their feasibility in context of the aims of this project and the CreatorCustom software tool. In this context, feasibility is defined in terms of the technical ease of implementing the idea the participant has suggested within this particular system, considered in relationship to the potential effects of such implementation on usability, user experience, and the larger motivating themes of the system design, and the project more broadly.

P02 described wanting clear feedback from the system about what was happening in instances where it appeared that no change was made to the figure after an interaction, which he theorised was likely the result of hitting a "limit" within the system. This points to the larger difficulties reported by the majority of participants with the consistency and responsiveness of the direct manipulation when modelling the figure. Indeed, CreatorCustom falls short of Nielsen's (1994) directive toward consistency of action and result, and providing immediate feedback to the user in this regard, and because of these delays, is less 'direct' than Shneiderman (1997) conceived of in a one-to-one sense. While the degree to which a particular modifier can be applied by the user is not limited, as is the case in range-limited slider-based systems, the separation between the cursor position and the location of the affected area of the figure body, which arises from mapping the cursor value to a numerical value in order to produce the appropriate degree of transformation, was clearly confusing for many users. P09 and P12 suggested keeping the selected tool highlighted while it is in use, since they reported forgetting which tool they were using, as did a number of other participants across sessions. Similarly, P03 suggested during one of the post-modelling sessions that when a tool for modelling the figure is selected, the cursor might change to a small graphic, such as a hand or a knife, to indicate which tool is selected. Nielsen (1994) emphasises the importance of providing feedback and noting the receipt of user input for usability and clarity, and both of the solutions proposed by participants are feasible to implement and would provide clear feedback to the user about the change in system status after selecting a particular tool.

Participants also described their desires for greater specificity about which modelling interactions were available to them, and for more explicit or detailed feedback from the tool during the modelling process. P12 indicated that a map of the interactions available for the figure would be helpful, making explicit which interactions and in which direction are available with a graphic on the figure body itself, in addition to the helper graphics. In a similar vein, P10 and P13 suggested that the active areas of the

tool could be dynamically revealed when the user moves the cursor over them, in lieu of the helper graphics, so as to be sure that they are selecting the desired area of the figure body which will produce a visible output. P06 and P09 articulated a desire to be able to select multiple active areas of the figure body at once, specifically through pressing the Shift key while moving the cursor over the desired areas of the figure body. The utility of this idea is clear, since it would allow users to follow a principle similar to that of scaling a brush diameter in 2D digital software. Though dynamically changing the size of the affected area would require an interaction method which does not rely on singular morph targets for fixed areas of the body, such a concept could combine multiple targets or divide them along the levels of detail to achieve a similar result. Likewise, P04 described the potential for extending the tool for use on other platforms, such as LEAP Motion, VR platforms, and touch screen tablet settings, which she theorised might provide a clearer connection between the user's input and the output they achieve in 3D, especially for novice adult users and children.

The participants also described changes which they would find helpful in terms of the tool's relationship to the body, and what kinds of bodies the tool is capable of creating. Among others, P09, P08, and P01 wanted to add hair to the figures they designed during the sessions, which P01 discussed as important to identity, expression, and representation of human bodies, particularly for gendered representation and transgender users. Though P01 acknowledged that hair can be an expensive element of such systems when generated as individual strands, they suggested using fixed geometric shapes which can be manipulated in order to provide a compromise for an important representational element. More similarly sculptural additions to the body were also discussed by participants as being potentially useful or interesting to work with in this context. Several participants queried the inclusion of more-than-human characteristics, like tails, which P08 suggested, or cat ears, in the case of P03 musing about how to achieve an idea P04 discussed. P08 also described wanting to add tubing and models of other things, such as insects, to her design, and P09 and P01 independently articulated desires to add additional heads and other body parts to their figures. Still other participants, specifically P06, P09, P01, and P05, felt that adding geometric shapes which could be integrated with the figure or modelled from directly might present a useful addition to the current capabilities of the tool.

Finally, some participants addressed concerns which would require a shift in the materiality of 3D modelling itself, revealing further avenues for scientific and creative inquiry and research. P13, who did not have prior experience with general 3D modelling tools, spoke at length about her conviction that mesh-based 3D modelling was not intuitive, particularly for human modelling; rather, she suggests that a system which allows the user to individually modulate layers of "skeleton, muscle, and fat" would be most understandable for her. This method would almost necessarily centre an anatomical approach to modelling the body informed by medical and cultural norms about the form a body can or should take, and is worth problematising on this basis. More interestingly, however, such an approach would also be difficult to execute in the mesh-based 3D modelling method common in tools for modelling 3D

human figures, in which a low-quality proxy mesh must be substituted in order to guarantee appropriate graphics display for a single layer detailed 3D body. While P12 and P13 discussed the treatment of lighting, movement, and pose as separate tasks in general 3D modelling tools, P13's desire to control these elements and to integrate movement and pose into the figure, which P03 and P04 also referenced, speak to the creative possibilities and potential of designing for modelling beyond shaping a static figure independent of animation, lighting, and spatial context. Similarly, P06 articulated a desire for a cutting function, in order to remove material in an analogous sense to subtractive sculptural carving, which she expected from the 'Carve' tool. The materiality of mesh-based 3D modelling, dependent upon its structure as a series of interconnected points, lines, and faces, functioning as an outer shell, is distinct and clearly provides advantages for certain users, among them P01, who benefits from the amount of abstraction such a material affords. Even still, it is clear that this style of modelling does not meet the material or usability needs of all artists who might be interested in digital 3D modelling, and that additional concepts for digital 3D materials and tools have the potential to provide new points of entry into this domain.

5.4.4 Participant Expectations

A particular area of difficulty for certain participants concerned what P13 described as a persistent feeling of making something which looked "bad". Participants in the first session specifically struggled with frustration related to this point, and during the group interview, the participants were asked about those feelings of frustration. Based on their responses and those of other participants who alluded to similar feelings, this frustration, dejection and confinement to a sub-par outcome hinged on the participants' expectations of digital tools, their output and what it should be able to accomplish, as well as on their own understanding of their skills and capabilities as practitioners. P13 and P10, who did not think that models produced by the tool were adequate, described attributing the results they were able to achieve to their own lack of skill, at least at first, with P13 saying that the question she would have been able to articulate during her frustration with the modelling portion was, "How do I not be shit at this?" However, P10 describes seeing the other participants experience similar results, and feeling validated in her belief that the tool was "the problem", rather than her own input.

This feeling among this cohort, that the tool produced poor results, was primarily based on two reasons. The first seemed to be because the tool produced bodies that these participants did not expect or necessarily consider "human" (P13 and P11 made detailed reference to the anatomical issues they observed in the models, both in passing during the session and during the interview itself), and the second because they were not able to control the tool's output in a one-to-one sense because of the delay and resulting randomness they perceived as present in the tool. Their lack of ability to control the tool in the way they expected, as articulated by P13 and P06 in separate sessions, seemed in

particular to be at odds with the expectations of control that they had for digital tools; many of the participant suggestions, indeed, related to providing the user with more technical control over the results they were able to achieve. While P12, notably the only participant in that session who had used 3D modelling software previously, drew a connection between the often surprising and seemingly random results of other 3D modelling tools and those the tool produces, he also expressed frustration with the results the tool produced, as did participants in other sessions. To some extent, this feeling of frustration may have been influenced by a perception among many participants that they were being prompted to create a representation of a figure which was outside the aesthetic conditions of the tool itself, but, in a similar sense, their expectations in terms of the figure body and the ease of interaction may also have influenced what they expected to be able to achieve.

However, participants also blamed themselves for the results they were able to achieve, feeling that they either also did not have the skill to use the tool, or that they were not able to use the same strategies they normally used in order to learn to “control” the results they achieved. P10, P11, P13, P06, and P08, among others, described such feelings; P13 said that, when using the tool and feeling frustrated, she assumed that she was “the problem”. P06 likewise articulated a deficit in her own skills as contributing to her experience of the tool, since she is not normally proficient in sculpture and related analogue physical skills, while P08 said, “I don’t know if this is because I never used any kind of software like this before. Like there is a thing that you have to understand about... use it beforehand but as a first time user I found it quite difficult to control.” However, P08 also expressed her conviction that continuing to use the software tool would make her better at using it, an idea which was not shared by the other participants. P13 described being primarily self-taught in her art practice, “figuring out” how to use tools by “playing around” until she figures out what to do, while P11 said that she has often walked into situations, especially in academic settings, without knowing what she is doing, and figures it out as she goes. Both of these participants expressed that this strategy did not feel effective when using the software tool. Some participants also felt that their previous skillset, experience, or expertise should inform their ability to understand and work effectively with the tool from the beginning, with P10 saying, of larger questions about how to interact with the tool, “I wouldn't expect to have to ask a question that basic, given the skillset I have already.” In this sense, the participants’ expectations of themselves, and of their ability to control a digital tool in a particular way, informed their experiences when using the software tool during the workshop sessions.

5.4.5 Similarities and Differences to Other Tools

Though the relative difficulty of 3D modelling from scratch in general 3D modelling tools is referenced often in literature about creating tools for easy modelling for novice users, little data is publicly available about the experiences of users engaging with these systems. While this was not the purpose of this user

study, users did discuss their experiences with 3D modelling using existing tools in the workshops and group interviews, and were prompted specifically to compare their experiences with other platforms for modelling 3D humans, whether in general tools, standalone tools for modelling 3D human figures, or video games CCIs. P03 and P06 both described a feeling of detachment between the hardware, in this instance a mouse, keyboard, and screen, and the 3D modelling space in separate sessions when using 3D modelling tools, acknowledging the complexity of designing a 3D object on a 2D surface using hardware which feels disconnected from the experience of modelling itself. P06 noted that the difficulty she experiences in this sense is also due to sculpting generally not being a skill that she feels she is proficient in, and that modelling a human form in particular feels challenging, because the sculpture needs to look a particular way. P05 described 3D modelling as requiring a high degree of patience and precision, which she finds admirable but does not possess, and P02 described Blender and similar general modelling systems as having a number of complicated controls and buttons, which require a significant time investment to understand and use effectively. P13 articulated that modelling organic forms using existing tools is more difficult in her experience, while P04 noted her perception that general 3D modelling tools are not novice-friendly at all.

Having used tools for modelling 3D human figures in the past, P12 described the figures produced by CreatorCustom as producing a similarly “weightless, uncanny valley” feeling to the figures in those programs while modelling. He described the representations of human figures that these tools produce as doll-like, which he also indicated that he felt was likely to be easily understandable and accessible for a number of users. As mentioned by other participants in that session, some of this feeling for them was dependent on their perception that the tool’s basic pose for modelling is not comparable to how a human being would stand or position themselves in the physical world. P13 in particular described this form of modelling as lacking movement and weight, as would be evident in a physical model in space. The ability to add pre-designed poses and apply them to the figure while modelling, which was present in the original codebase, has been retained in the software tool but was not used as part of the workshop, though participants P03 and P04 did access and browse through the options during the individual modelling session of the workshop they participated in, and were happy to use this functionality. Several participants also mentioned that the tool provided less precision in terms of camera navigation than comparable software for modelling digitally in 3D.

Some participants also felt that the tool required skill to use effectively, similarly to other tools, both those for specifically human and general 3D modelling alike. P08 and P06 surmised that increasing their skills or time spent with the tool would make them better at using it, while others felt that this tool was likely to be difficult to use, regardless of practice or time spent. P06 specifically found the tool intimidating to use, primarily because it was modelling human figures rather than less detailed or structurally specific abstract shapes. P12 expressed that the difficulty presented by this system was similar to other 3D human figure modelling tools, creating similarly outsized and difficult to control

modifications in response to relatively subtle interaction input, saying, “You can pull things and the whole body, like, twists out of shape in the kind of, same way.” P03 also felt that the task of modelling a 3D object on 2D surface presented a certain degree of difficulty, which she perceived as inherently limited, stating “...As soon as you do it on the computer, you’re forced to work in 2D onto something that’s 3D, so it’s not very intuitive and it never will be, unless you have some sort of tool to enable 3D movements.” Participants P03, P06, and P10 discussed the comparative ease of use of modelling in VR, which they experienced as more similar to modelling a physical object in real time.

P01, who uses both 3D modelling software and specifically human modelling software regularly in their practice, discussed the stability of the tool in comparison with Sculptris (Pixologic 2009), a general 3D modelling tool marketed specifically for beginner users. They describe other 3D modelling tools, and Sculptris in particular, as generating a large number of un-triangulated polygons in response to user input, especially when creating non-traditional or significant modifications, resulting in tools which crash frequently and without warning. P01 described this experience when using other software tools as frustrating and disruptive to their creative process, describing the experience of such a crash as, “Imagine you’re drawing something on paper, and suddenly it just [*mimes ripping the page in half*]. Like what the hell!” They praised the stability of CreatorCustom when making extreme modifications which result in the body losing visual coherence, actions that are often discouraged or which are actively designed to prevent users from performing, in the case of range-limited sliders. Indeed, P01 and P07, who both report using 3D modelling regularly in their artistic practice, had a strong understanding of the differences between CreatorCustom and other existing tools and norms in this domain, with P07 specifically identifying the Randomiser as producing unique results in comparison to the capabilities of other programs.

The variable levels of experience with 3D modelling tools, human or otherwise, among the participant group, make explicit comparative analysis of participant experience levels difficult, beyond the most and least experienced participants. Participants with incidental or infrequent experience of 3D modelling tools, like P06, P05 and P12, among others, have experience with using different software tools on a variety of hardware, from VR headsets to personal computers. In contrast, P01 and P07 reported using general 3D modelling tools on personal computers regularly in their practice, and P01 also works specifically with tools for modelling 3D human figures in this context. While P01 and P07, the most experienced participants, were able to contextualise and appreciate the differences and opportunities offered by CreatorCustom, P02 and P09, who reported having used 3D modelling at some point previously, and P08, who had never used 3D modelling software herself, were also able to identify interesting or useful aspects of their experience with CreatorCustom. Indeed, P01 and P02, who were the only participants in their session, reported becoming engrossed while using the tool. P01 said that when they use other software tools, they are often thinking through how to best use the affordances of the tool to their advantage in making what they want to make; in CreatorCustom, they

said, “You're inside and processing, making, not inside the process of learning, debugging, checking, yeah.” P02 describes this experience as “getting past the tool”, an experience which he experienced as unique in comparison with his previous experiences of using digital tools to create artwork.

P04 felt that there was strong potential for this system to be easier to use for beginners than general 3D modelling software, which she felt presented a very high barrier of entry to total beginners. P03 described the software tool as a nice in between, in terms of interaction in general 3D modelling tools, which is very specific, and tools which limit the user to modifications determined by their perception of what the user might want to create. She likewise noted the possibility that this tool could be useful for beginners, in terms of understanding the design space and moving on to other, more complex systems. P02 had only modelled human figures in video game CCIs, and felt that this tool offered more opportunities for creativity and expression, since CCIs in his experience tended to focus more on accessories or secondary aspects of the body like hair and clothing, rather than the body itself. P07 and P08 felt that the tool provided a degree of randomness and opportunity for discovery not found in other tools, and that this difference might allow for the possibility of providing inspiration when the user engaged without a specific idea. Though further discussion of the body will take place in 5.4.8, P09 noted that they felt much more represented by the randomness of the system and the figures produced by this tool than by the video game CCIs they had used in the past to create 3D human figures.

5.4.6 Creativity Support Index – Results

Cherry and Latulipe’s Creativity Support Index (CSI) (2014) was also used in order to evaluate the creativity support provided to the users for the tasks performed during the workshop. Similar to NASA’s Task Load Index, the CSI evaluates the creativity support of the tool being studied for the individual user when performing a task. The authors are clear that the rating provided by the CSI refers to that tool’s creativity support for the task in which it has been used in that particular study, and not for the tool in any kind of general sense. The evaluation is provided along the tool’s support of six metrics relevant to creativity: Results Worth Effort, Exploration, Immersion, Expressiveness, Enjoyment, and Collaboration. There are two parts to the CSI; the first asks the user to rate, on a scale of 1-10, the tool’s performance, with two questions each referring to the six categories. The second includes a set of comparison questions related to these six categories, where the user’s choices and priorities determine the weighting of their scored responses to the initial questions. While certain categories may be omitted as relevant, particularly the collaboration category, which is not always relevant to all tools, it is not encouraged by the authors since it undermines the ability of the data to be compared to other full CSI ratings. Each CSI rating for each participant is out of 100 (the highest possible score), with the score for each category weighted in terms of the user’s priorities.

The CSI was distributed to the participants after the second modelling session in each workshop. The initial portion of the survey, which asks the participant to rate how well the software tool supported set metrics of creativity, was administered directly after the session, while the second portion, where participants rate how important to them each of these metrics are when completing a task, was administered later via email, owing to researcher error during the sessions. Cherry and Latulipe state that when administering the CSI, it is important that between the three factors of the tool itself, the task, or the level of expertise of the users, only one factor among these three factors vary (Ibid, 21:9); this criteria was met in this context, since all of the participants performed the same prompted task using the same tool, though they have varying levels of experience with 3D modelling and modelling 3D humans in particular. No user had prior experience with this particular tool, a factor which the authors note may have a greater influence on the CSI score of a tool than general domain experience itself (Ibid, 21:8-9). Importantly, it should also be noted that because the ability to work collaboratively was not a factor which informed the creative aims or design concerns of this project, the collaboration metric normally included in the CSI was not included here; as such, direct comparisons of the overall CSI score of this tool to that of others scored using all six metrics should not be made. However, the CSI score reveals a quantifiable scale for evaluating the issues and priorities of users when completing the workshop tasks, and provides another dimension for the understanding of the artists' user experience in this setting.

Participant	CSI Rating
P01	83.67
P02	92.33
P03	13
P04	25
P05	29
P06	19.33
P07	75
P08	73
P09	35
P10	14.67
P11	—
P12	28
P13	—
Average (SD)	44.36 (30.10)

Table 7: The overall Creativity Support Index scores for each participant who completed both portions of the CSI survey. The average of the total scores and the standard deviation (SD) of the average are recorded.

11 out of the 13 total workshop participants filled out both portions of the CSI, with an average overall score of 44.36 (SD=30.10)(Table 7), indicating a low overall average support score with relatively large variation between the individual participants. While many participants scored the tool either relatively low or relatively high across all factor metrics, some participant scoring did vary more significantly (for individual score breakdowns, see Appendix E). Overall, the factor which the participants rated as of highest importance to them when completing the task of modelling a 3D human figure of their own choosing using the CreatorCustom tool in a workshop setting was Expressiveness (Table 8), with relatively low variation between participants. While the average score given to the expressiveness the tool supported is very low, there was variation in these scores, with certain participants perceiving a greater support for expression in the tool than others. Achieving Results Worth Effort and Exploration were also rated relatively highly in terms of importance to participants, while Immersion and Enjoyment were given relatively low importance as factors of creativity support.

Factor	Avg. Factor Counts (SD)	Avg. Factor Score (SD)	Avg. Weighted Factor Score (SD)
Results Worth Effort	3.45 (1.13)	5.23 (3.37)	33.64 (22.25)
Exploration	3.18 (1.17)	3.73 (3.01)	24.18 (22.58)
Immersion	2.27 (0.90)	4.14 (3.07)	19.18 (16.76)
Expressiveness	4.09 (0.83)	4.64 (3.17)	38.45 (29.55)
Enjoyment	2.00 (1.26)	4.77 (3.39)	17.64 (12.88)

Table 8: Results for individual factors used in the CSI (N = 11). Column A is the average number of times all users chose a particular factor during the comparison section of the CSI (out of 5.0 possible), Column B is the average rating all users gave to CreatorCustom for each factor (out of 10.00 possible) and Column C reflects the user's scores, weighted according to the factor's importance to these users when completing this task (out of 100.00 possible).

Results Worth Effort also received a slightly higher average score from participants, indicating a higher degree of support in CreatorCustom (when used in this context) in terms of the continuity between the effort the user exerts and the results they are able to achieve. The weighted factor score (Average Weighted Factor Score, Table 8), which weights the participants' scores of each factor in the tool (Average Factor Score) according to the degree of importance users place on those factors for this task (Average Factor Counts), recontextualises the score given for each factor individually. Given the low overall average score for the tool, and the fact that only four individual participants out of 11 scored the tool above 50.0, this indicates that the tool provided poor creativity support for these particular users overall when performing the task assigned during the workshop. However, it is notable that two of the participants who rated the tool above 50.0, specifically P01 and P07, were the only participants who reported using 3D modelling tools regularly in their artistic work. While the reasons for this relative failure are well-explained by the difficulties and experiences the participant users report during the group interviews, it is also worth considering the implications of, for example, participant statements regarding the randomness of the tool and its suitability for a more open-ended task than the one users

performed during the workshop session; further discussion of this issue and of the CSI will take place in section 5.5 of this chapter.

5.4.7 Expression, Creativity, and Ideas

The workshop participants were asked to come up with an idea for a figure that they would like to make before using the tool, with a partner in the first instance and alone in the second instance. The purpose of this exercise was to document and record changes in the participants' ideas over the course of the session in a tangible way, and to provide a prompt for further discussion of how their ideas evolved while using the software prototype. The participants were not given any particular guidance that their idea should be a literal visual representation of a body, and indeed, some participants represented their ideas using text, and varying levels of line and shape-based abstraction (Figure 21). However, others did interpret this instruction as prompting them to draw a body and then to create a 3D modelled representation of that body using the tool. Given these instructions, users clearly and understandably evaluated the tool based on its ability to execute their ideas, in many cases, in a literal one-to-one sense. Some participants, like P10, P13, and P05, expressed that they were not able to change important parts of the figure body, such as the face and finer body details, or that they were not able to change the figure in any significant way from the figure they started with, as by P10, P11, and P13. When users did make modifications that were similar to their drawings or desirable, several participants described those changes as either difficult or accidental. The verb “managed” was used by P08 repeatedly to describe specific successful actions in her modelling process, while her statements often reflected confusion about how to achieve results she wanted to execute, implying an exceptional quality to the desired attributes she did *manage* to create. This sentiment was echoed by other participants, who discussed creating or achieving desired modifications accidentally, as having a general lack of control over modifications—as described by P06, P09, P13, P08, and P11, among others—or “just trying” tools out as P06 did, rather than trying to specifically execute their ideas. While retaining documentation of the participants' initial ideas did provide interesting opportunities for discussion during the workshop sessions, it is also possible that this element of the workshop sessions decreased participants' desire or ability to explore the tool with fewer fixed ideas in mind.



Figure 21: A spectrum of abstraction in the participants' sketches on paper. Attribution, clockwise from top left: Ruth Ingamells, Fion Gunn, Mylo Dylan, Friendred, Lollipop Guild, Pete Jiadong Qiang

Indeed, participants described changing their ideas or intentions once they had an idea of the capabilities of the tool, or some experience using it during the session. P06 and P08 described each changing their ideas during the modelling session itself, when they felt that they were not able to execute their original idea within the software tool, while P10 reported seeing “where the tools led” her in the second, individual modelling session. Participants, of course, based these changed ideas on their perception of what the tool was able to produce, which, while not always strictly correct in terms of the actual capabilities of the tool, produced an experience for those users which they reported as more satisfying and successful, as was the case for P09, P11, and P08, among others. P13 reported feeling that the program was trying to “force” her to do a particular thing, and that P11, who had tried to “go with the flow” of the program, had had a “smart” idea in letting the program take the lead. However, as P12 flagged during the group interview, the structure used in the workshop is not necessarily the way that a user might approach a new tool on their own; namely, a user might not try to model a

specific idea right away, but rather, interact with the tool and explore its functionality and affordances first. In this sense, it is unsurprising that users' ideas changed as they became acclimated to the tool, and had a clearer sense of the possibilities from their interactions and experience.

The ability of participants to learn, integrate, and apply knowledge about the way the tool works also had implications for the participants during the workshops. While discussing their designs in the before and after discussions for the modelling sessions, some participants reported being happier with similarities between their designs and the outcomes they were able to achieve over the course of the session, the two sessions, or over time broadly while working with the tool. P11 reported that learning which aspects of the tool were easy to use, and which kind of exaggerations the tool created, allowed her to design more effectively in the second round and achieve a closer likeness. Particularly, P07 and P08, who worked together in the collaborative modelling session, described building on modifications they created together in their own individual designs in the second session, using tools and modifiers they noted in the first session. Though both of these instances, among others, indicate some level of learning and awareness around the capabilities of the tool and how to apply them in order to create a desired modification, participants also expressed that the unpredictability of the tool made it difficult for them to learn and therefore use the tool to any significant effect, in some cases. Although P11 described having some success with the tool, she also articulated that this learning process did not ultimately feel fruitful in allowing her to understand the rules of the tool or how to control it. Likewise, P10 and P13 described feeling like there was “no method to the madness”, leading to frustration and a feeling that their actions were pointless in creating tangible results.

Where some users found significant interest and creative meaning in using the tool was in what P09 termed the process of “collaboration” with the software tool. As was previously discussed, the Randomiser function and the inherent randomness of the tool were cited as major sources of this collaboration, which P08 and P09 described as the figure, “telling you what it wants to become” “forcefully”, respectively. P02 referred to the experience of using the tool as a “back and forth between the user and the software” while presenting the work he created in the modelling session, and P09 described enjoying “giving up control” when using the tool, an experience other users described negatively in similar terms. P07 described being inspired by the tool, saying, “The Reset, sometimes it'll give you a really unexpected but interesting... sort of really, really interesting shapes that might intrigue you or inspire you somehow.” This is a sentiment P06 and P08 also echoed, with P08 saying of the tool, “It just creates, like, new things that you didn't expect... I think I wouldn't really enjoy using it if I had something in mind that I had to create”. The software tool challenged the participants' expectations about what they wanted to create, and in some cases, served as an explicit source of inspiration, as described by the participants during the interviews in their own words, but also in moments where the researcher observed participants looking at the randomised figure on screen when

deciding what they wanted to create, as P4 and P11 in particular did during the design brainstorming sessions.

Finally, P01 discussed what they perceived as the advantages of limiting the number of tools, methods of interaction, and camera views available in the tool. They described how the restrictions present in the tool led them to be more creative, saying, “It forces you to try and be creative because, yeah, you really can give time to think within this software, yeah. It’s actually, it gives you a pencil, it just gives you one pencil, like black colour. You have to do something.” They contrasted this experience to that of using conventional 3D modelling software, which they likened to having a wide variety of pens, pencils, and erasers available to them, and said that having such a wide array of media available to them as a child caused them to think more about the media and which to use, rather than what they wanted to make. Responding to their point, P02 said, “When you’re faced with being able to do literally anything, that often is too much and actually stops you creating, to sort of have a yeah, yeah, to have some restrictions and some limitations actually fosters creativity in a lot of ways.” Their creativity as activated by certain restrictions, restrictions to their ability to be technically precise and to the conventional complexity of 3D modelling tools in particular, was cited by them as facilitating their ability to “get past” the tool and become immersed in the process of creation.

5.4.8 Bodies: Expectations, Experiences, and Realities

Given that CreatorCustom is a tool for creating 3D digital human bodies, it is not surprising that the workshops and activities elicited a number of revealing anecdotes, exchanges, and comments generally and during the group interviews. Participants made many comments concerning the digital bodies in passing, some of which were derogatory (as when P13 described her model as a “deformed freak” while modelling, or multiple references to evaluating whether the model was ‘normal’ or ‘abnormal’) or equated the bodies the tool produced with illness and pain (references to the model having “scoliosis”, as by P11, or “making a tumour”, as P05 described), or with non-human creatures (as in the case of P03 deciding to make an orc from *The Lord of The Rings* series). During the modelling session where participants were asked to work together, P04 and P03 worked together, and set out with the intention to create the most “normal” model possible; however, on further discussion, it was clear that P04, who is a designer and uses a number of average metrics as human stand-ins in her practice, had a fixed idea of what ‘normality’ meant for her, but struggled to detail the characteristics which described that normality. She referenced normality again in discussing changes she would make to the system, saying that she would prefer to start with a more “normal” body shape, which would provide a “blank slate” for modelling a variety of different bodies. Chiming in, P03 referred directly to the body produced by the tool as not quite human, saying that it would be nice for such a system to provide a starting point which was, “A little bit more human than what was default [in CreatorCustom].”

P10 articulated similar concerns about the bodies the tool produces, though her concerns were more explicitly articulated as about the lack of 'realistic' characteristics in the tool. While presenting her work with P11 during the co-modelling session, P10 described their model as "in the borderlands of gender identity", but also complained that the model had too many "meaty", "masculine" characteristics which they were not able to remove, even though the initial model was "supposed to be gender-neutral". She described the model during the interview as "not good and fundamentally flawed", which, for her, affected the usefulness of the tools themselves in making the changes she wanted to make to the figure. It became clear that she perceived a problem with a lack of 'ethnic' characteristics as well, since she perceived that "...as human beings, we can identify gender before any other thing. Gender and race..." She appeared to identify these characteristics primarily with head and hip size and proportion; she also referenced later that anatomical modelling and the lack of anatomical accuracy in a classical sense present in the tool were such that these models would not "count", potentially as bodies at all. Likewise, P13 added to this that anatomy and anatomical drawing in particular references ways of understanding the body's parts in proportion to one another, which were not reflected in the models the tool produces; however, she also conceded that artistic representations of bodies are not always anatomical or literal, "that's sort of like, how artists have changed and how we sort of, you know, translated bodies." Though she emphasised the importance of strict anatomical accuracy, P10 stated that she felt the inclusion of genitalia was "intentionally provocative", which she did not "see the point of" including, since she did not feel that they were complete or could be manipulated effectively.

In contrast, some participants appeared to intuitively understand the theories and politics used to inform the creation of the tool, or to relate their own ideas to the bodies that they created using the tool. When responding to a comment about the lack of normalcy of the figure produced by the tool, particularly in terms of the genitalia, P05 reasoned that the genital mesh was included because, "You give the model everything for the person to start with and they choose what they want, so they can create the model that they want." She describes this perception changing over the course of the session, saying that she initially did not understand the shape of the model, but the flexibility to a variety of different approaches to designing the body became clearer to her over time; she also intentionally tried to and succeeded in making a figure with fewer than four limbs. P01 praised the abstraction of the body that the tool affords, which they stated is a concept that is important to them to maintain in their practice generally, but which was activated and applied to representing the body specifically in an unexpected way by being restricted to modelling a humanoid shape in the tool.

P09's articulation of their experience while using the tool also neatly encapsulated many of these foundational ideas. They described feeling challenged in their perception by the bodies the tool presented them with, and also commented on the conversations taking place amongst them and the other participants during the session, stating, "I also observed us also saying, 'oh, no, it's less human' and this and that, and I'm like, well, no, actually, I've seen that body as a normal body, also as human,

and I thought that was interesting, just how like we've framed, and not framed, like, what human is in terms of whether it's wonky or not." They articulated the idea of the othering of certain bodies, particularly trans bodies, as upholding cis normalcy during the co-modelling session to their partner while in dialogue about their design, and seemed to engage deeply with the representations of the body that the tool produces in terms of their own ideas and experiences. P09 described the experience of recognising "different kind of iterations of myself and people I know" when using the tool, in a way that they had not experienced when using other systems, and that the randomness and unexpected quality of the tool, in particular, facilitated this. They said, "I feel like that's a big part of being trans. It's like, well, it's very random, actually. Like how the body changes with hormones, and like, it is all just a little bit like, oh, I guess that's happening now and I thought that was quite...I felt quite represented in that."

5.5 Discussion

While the interview data provides a variety of interesting areas of feedback and opportunities for further inquiry, this section will address several points raised by the participants which relate to the larger concerns of this dissertation. Specifically, the following sub-section (5.5.1) will address materiality and the mismatches participants perceived between the language used for certain tools and their results, seemingly exacerbated by the variable responsiveness of the tool. In section 5.5.2, the serendipity and opportunity for suggestion and surprise present in the tool is discussed in relation to the body and the participants' perceptions of the bodies they might create, indicating that the tool may produce more serendipitous results for some users than others. Finally, section 5.5.3 describes the uses and possibilities of creative tools in context of the expectations of users as articulated during the workshops and group interviews, especially in context of creating 3D human figures for artistic applications.

5.5.1 Future Changes to the Tool

Though some changes suggested by the artist participants across these sessions are more relevant to the aims of this project than others, the most consistent issue was inarguably the perceived responsiveness of the software tool to the user's interactions. This was mentioned across all sessions, with some participants (for example, P10 and P13) recommending more consistency across the board, while others, particularly P01 and P02, wanted direct feedback about what was happening when they experienced these issues. While further optimisation of the responsiveness of the tool may be carried out, based on the way the tool is built in this particular environment (as described in Chapter 4), some degree of lag will remain. In order to negate this, the tool would need to be moved to a platform which would be able to facilitate this style of interaction more effectively. Likewise, such movement could

allow for areas to be activated and determined based on a dynamically controlled area, as in a 'brush' tool, which might alleviate concerns by P05 among others about the lack of modifiers available for certain areas, though it may also result in additional lag in calculating modification results due to the high detail level of the figure meshes. Though some additions suggested by the participants, including extra meshes for dynamic placement, would require significant expansion of the tool or development in a new environment, exploring the expansion of the targets available in the tool to allow for geometric and other extra-human modifications would represent a logical expansion of the sculptural aims of the tool.

Other initial priorities, which would be simple to implement and would address specific issues raised by the participants, include the addition of multiple camera angles and a pan camera function, as well as the suggested additions to allow for clearer delineation of the tools and the active tool in particular. These changes would allow the user to more easily and flexibly orient themselves to the digital 3D space and to the functions of the tool, which is well within the desired results of the system. However, while the responsiveness and degree of control present in the tool might be tweaked, such changes must be balanced with the degree of control they provide to the user, and the amount of surprise they facilitate the user experiencing. It is clear that this balance was not achieved for all users, but it is likewise possible to infer from these results that some users prefer more surprise and serendipity in their tools than others, and this tool is, after all, oriented toward suggestion of figure bodies and representation. As well, P10, P13, and P04's suggestions that the tool should produce more normative results, for example, are outside the aims and interests of the project, and may be better represented by other (and perhaps even existing) tools. This point was queried by P02, in responding to the preliminary report of the findings sent to the users; he stated that, "I think it would be impossible to attempt to define what a normal body is so I don't think that would be a fruitful area of development."²⁶ Indeed, the question of normativity and the degree of control users could or should have in a creative tool are addressed further in sections 5.5.3 and 5.5.4, but the lack of normativity and other similar features present in the tool was, of course, the point.

5.5.2 Materiality, Responsiveness, and Language

CreatorCustom was designed with an eye to Gaver's (1991) concept of technology affordances which mimic those users are already familiar with from the physical world, in this case, from art practice. While some participants, particularly P06 and P03, appeared excited about the use of familiar language from artistic contexts within the user interface, they were not necessarily satisfied with the results they achieved while using these functions. In several instances, participants described the tool not adhering to their expectations of what an action means based on their previous artistic experiences. P03 and P05

²⁶ Email correspondence, received 30 June 2020.

articulated in dialogue with one another that they felt ‘Carve’ should have been a cutting tool similar to subtractive sculpture, which P06 echoed in discussing wanting to “slice” the figure using that tool. P03 also stated that she was unsure about ‘Loosen’, and how that term might apply to a physical sculpture in particular, which she did not appear to have a reference point for. Likewise, participants across the first, second, and third sessions described difficulty in differentiating what different tools did, since the language used for each tool indicated a very different response or result to them based on previous knowledge, and was perhaps more difficult to distinguish within the bodily constraints of the tool.

While some of these issues may have been exacerbated by issues described in tandem by participants related to the responsiveness of the tool, these statements, among others, indicate that the materiality of 3D modelling and its response provided a significantly different experience than the materiality of media in which they were familiar with performing that action. As P13 described, ‘Push’ and ‘Pull’ were familiar to her because of their use in other software programs, but she struggled to find a reference point for ‘Add’ and ‘Collect’, among others. Given the popularity of Push/Pull in usage across sessions, participants’ familiarity with these actions from other software tools may be a primary source of comfort with these tools over others, but it may also be worth considering the dependence of some of the action words chosen for tool designations on particular kinds of tools, such as a chisel or similar implement in the case of ‘Carve’. This may also be particularly stark in cases where the two actions on each end of a scale had different relationships to tools, as in Carve/Round, where ‘Carve’ implies an action applied through an implement and ‘Round’ refers to both an action and a result. Similarly, the distinction between the behaviour of the material in producing a result and the actual result it produces, presenting more significant disparities in some cases than others, as perhaps in the case of ‘Loosen’, where the verb is more clearly associated with a material behaviour than with a result. While the use of action-oriented language from artistic practice in this tool represents a useful first exploration, the use of language might be better matched beyond the familiarity of word and action and its potential results-based similarity. Future terminology and classification for digital tools might examine these intersections further to ensure that the relationship between the material behaviour, rather than just the visible results on the 3D modelled object, is capable of replicating that experience for the user in an understandable way.

5.5.3 Serendipity and the Body: Possibilities and Limitations

The ongoing discussion of the randomness, unexpected qualities and results, and surprises participants experienced when using the CreatorCustom tool during the workshop sessions points to the serendipitous qualities of the tool for creative use. As P09 described, the tool challenged the ideas, intentions, and ultimate design choices of some participants, especially in terms of their design of the body itself, and, as in the case of P01, the tool allowed certain users to achieve a level of abstraction

which was either interesting or advantageous in terms of their practice more broadly. Some participants like P06, who struggled with the inconsistency and responsiveness of the tool's interaction generally, also enjoyed the especially serendipitous qualities of the tool, particularly the randomised Refresh function. However, it is also clear that for other participants, these qualities were not notable or exciting, and that because of responsiveness, perceived inconsistency of the tool, or the representation of the body itself that the tool produces, the tool did not meet these participants' needs, particularly for P10 and P13. The extent to which the tool did not meet these participants' needs appeared in these cases to specifically be predicated on their perception of the tool as producing random or substandard results, qualities which other participants found useful and exciting in a creative sense. This disparity in the range of experiences the participants reported when using the tool, especially with respect to the tool's serendipitous qualities and the effects of those qualities on the figure body, are notable and require further discussion.

One explanation for this disparity might be that the output of the system provided more useful results for some users than others, and that because participants were not given explicit control or input for many aspects of the serendipity present in the system, this was not a disparity that participants were able to rectify in their use of the tool. Certainly, in research literature concerning serendipity and serendipitous systems, specific attention is often paid to ensuring that the system is capable of producing especially relevant serendipitous results to each individual user, as the case of generating course suggestions to university students based on their favourite course they had previously taken, rather than their enrolled department or concentration (Pardos and Jiang 2020), or recommending films to users based on their ratings of films they have already seen (Kotkov et al. 2018), among others. In a more explicit sense, Waugh et al. (2017) detail the potential for distraction and frustration when participants are presented with "too much serendipity", either in the form of too much information, or too much information unrelated to their topic of interest. In the case of CreatorCustom, the output of the tool is limited to mesh-based 3D human figures, and the randomiser is intended to suggest ideas that the user may not have considered in their previous interactions with such systems, with particular regard to suggesting non-normative bodies and representational characteristics; the user's ability to affect this recommendation is during modelling itself, where they are able to control which modifiers they apply and to which degree. However, the lack of responsiveness many participants users experienced when modelling with the tool led some participants to feel that they were not able to control the tool at all, as P13 articulated, perhaps creating an experience of too much or unrelated serendipity for some users.

It may also be that specific priorities, experiences, or personal contexts informed participants' ability to relate and ascribe artistic meaning to the figures that they produced during the workshop session. As André et al. (2009) astutely distinguish in their analysis of serendipity literature and systems, the "success of serendipitous discovery is not just the find itself, but being able or willing to do

something with it.” They point out that while serendipity is credited as responsible for a variety of scientific discoveries and inventions, in these instances, the discovery in question was not *just* dependent on the chance encounter itself, but also on the encounter-er’s ability to connect the information they learned to other relevant contextual elements, giving their discoveries meaning. P01, who is an experienced and regular user of both general 3D modelling tools and systems for modelling 3D human figures, was thus able to contextualise that the stability of the tool when making new and surprising abstract shapes as a novel asset, in comparison to the output of other 3D modelling systems. Since abstraction and non-normative digital human bodies and representations are important to their artistic practice, the results of the tool were meaningful and interesting for them in a way which connected more directly to their own artistic work than was the case for other participants. Likewise, P09 described identifying their own body with the figure body presented to them in the tool and with the experience of modelling, which they named as similar to their experience of being transgender in terms of its at times unexpected effects. In this sense, their experience with their own body, outside of cisgender norms of coherency and wholeness, informed their ability to find meaning in the figures produced by CreatorCustom. While some participants were able to create meaningful context for the tool and the figures they produced, others were confused and frustrated with the results they achieved, perhaps because the material, modelling method, or results did not have sufficient relevance to their work or experiences more broadly.

Finally, the design of the workshops themselves may have undercut the serendipitous qualities of the tool to some degree. Each modelling session was prefaced with a brainstorming session, where the participants were encouraged to sketch or write about their ideas for modelling a figure on paper. While some participants used this brainstorming period to come up with non-literal concepts, like shapes, abstract lines, and lists of qualities, others drew figures they wished to create using the tool, and, in many cases, were then frustrated by the distance between their drawing and the figure they created using the software tool. The experience of brainstorming on paper was intended to provide inspiration for thinking about designing human bodies in a controlled setting which is likely dissimilar to the way in which they practice as artists, as the descriptions of their ideas before and the execution after were intended to facilitate description and reflection in the immediate time frame before and after of their use of the tool. However, it is also understandable that these exercises could have led participants to avoid using the tool in order to explore, since they had already explored their ideas on paper, or to compare their drawing and its digital counterpart directly, in a sense which implied failure for some participants if the two were not visually similar. Indeed, many participants, particularly in the session with P10, P11, P12 and P13, articulated frustration at the differences between their on-paper designs and the results they achieved digitally. P08 stated that CreatorCustom would likely not be fun for her to use with a very fixed idea in mind, but that she wanted to explore using the tool more, and likewise, it is possible that some participants perceived the requirements of the session as fixed, such that they did not consider using the tool to explore ideas, serendipitously or otherwise.

5.5.4 What Are Tools For?: Expectations and Potential

The ideas underpinning the feedback some participants offered about the suitability of the tool for the task of creating 3D human figures suggest certain assumptions about the role of tools, particularly digital tools, in creative practice. Several participants indicated that they were not able to control the tool, an experience some, particularly P10, P13, P06, and P03, found frustrating, and which other participants felt was worthy of comment, even if their feelings were more ambivalent. P09, for example, described the experience of working with the tool as “giving up control”, an experience which they state that they enjoyed; however, it is clear that for other users, this experience of not always knowing what the result of their actions would be was unpleasant. The similarity of these results to those articulated by Wiseman et al. (2017) in their discussion of immersive theatre and allowing participants to take and relinquish control over various elements of their experience indicate that this balance is difficult to strike in a way which satisfies all users, similar to what is indicated here. As articulated in 5.4.4, this expectation of precision control over the tool relates directly to their feelings of lacking success in the results that they are able to produce, or not being able to produce results which are not “bad”, in the words of P13. This idea of producing bad results might be interpreted as either relating to the experience many participants had of coming up with an idea on paper and not being able to execute it, or relating to the perception of those participants that the results that the tool produced were necessarily substandard, as P10 described. These factors in combination raise potentially fruitful questions about the role of software tools in artistic practice, what users expect from these tools in terms of interaction and output, and how tools for artistic and creative activities might support these practices more effectively in the future.

Though the interaction method and the unpredictable results it produced were points of frustration for some users who participated in the workshop sessions, the form of the figure itself was problematic for some participants. P10 noted that the model produced by the tool was “not good and fundamentally flawed,” a sentiment with which P13, and to a lesser extent, P04 and P03, seemed to agree. Many participants expressed some initial surprise in passing, whether positive or negative, toward the form of the models they worked with, and it was clear that for many of them, this surprise was due to the anatomical inconsistencies they perceived in the figure, as P10 and P13 emphasised at length. It is however notable that they also acknowledged the possibility of the body as metaphorical, as “cypher”, in the work of painter William Blake, during the same discussion. These participants may have had many reasons for tolerating ambiguity and artistic license in the work of others while feeling frustrated with this quality of the tool during the workshop, particularly that such metaphorical representations of the body may not be meaningful to them or their own artistic work. However, it is worth considering whether the digital context, and their expectations in this context, influenced what these users perceived as an acceptable level of accuracy. Additionally, P13 described frustration with not being able to pick the tool up quickly and make something “good”, and implicitly, anatomically accurate, within the period

of the workshop. This highlights what is perhaps an expectation that the software tool should prevent the user from making mistakes, such that they are not able to use a tool for making 3D human figures to unintentionally produce a figure they perceive as less than human.

A variety of users expressed frustration or dismay with not being able to execute the ideas they brainstormed on paper, or expressed feelings that their actions within the software tool did not produce their expected or intended results. Much usability literature prioritises providing clear feedback and linear task progress cues to the user, allowing users a high degree of control over the results of their actions, and preventing users from making mistakes, especially mistakes which they cannot easily reverse, as Nielsen does (1994). While Shneiderman (2002) discusses the possibilities for creativity support in a system which also allows users to generate or explore suggested ideas in a brainstorming period prior to the period of creation, it is arguable that such usability priorities, when applied in a creative context, reveal a tendency toward supporting precise technical execution of a pre-existing idea in a digital format, rather than brainstorming, exploration, or relating possibilities to one another in an open-ended sense. To be sure, there are stages of creative practice at which execution of an existing idea is most important, and where there are clear advantages to avoiding disruption or usability hinderances to this process; P01's metaphor for a software crash, in which the paper one is drawing on bursts into flames, is an apt one here. However, the stage at which precision, forgiveness, and predictability are paramount is not the only stage of creative practice at which creativity support tools may provide a useful framework for facilitating exploration. Specifically, Willis and Hina (2009) describe developing a tool specifically to support users during the exploratory stage of creativity, where, rather than seeking to minimise exposure to potentially unrelated or undesired suggestions, their drawing tool seeks to maximise surprising or serendipitous results. To disrupt, rather than faithfully reproduce, the user's expectations, is most appropriate to this stage of creative practice, in which the user is open to a variety of ideas.

While CreatorCustom can and should be optimised further according to its interaction and responsiveness, among other issues, it is worth considering how the aims of this tool, both in terms of user experience and representation, complicate metrics of usability and user control. Many tools for creative applications, indeed, allow the user to execute their ideas clearly and concisely, and such outcomes are arguably well-served by available and popular tools across a variety of creative disciplines. However, the ability to explore within limited boundaries and find inspiration in such circumstances is seemingly less prioritised and well-understood, in terms of usability and utility. Particularly in the domain of representing objects loaded with social, cultural, and contextual meaning, like human bodies, the ability of software tools to facilitate exploration, disrupt assumptions, and suggest new possibilities or modes of representation has significant potential. Aptly, Willis and Hina (Ibid) articulate their intention to take away some of the user's control when using their drawing tool, focusing on "the *creative process* as opposed to the *created product*." This phrasing is instructive, naming the distinction between

the desire for control users may have when creating with a fixed idea in mind, and the openness and potential presented by happy accidents in the concept development stage. That a creativity support tool might support users in exploring possibilities, rather than simply recording their developed ideas faithfully, provides a context for understanding tools not only in terms of the control that they afford, but also the opportunities they indicate.

5.6 Conclusion

The data and feedback collected during the workshops, and, particularly, the group interviews, advance the relevant research context about the current and potential utility of sculptural modelling for designing 3D human figures. Though the directness and responsiveness of the direct manipulation techniques used in CreatorCustom require further development and refinement, there is promising initial evidence that creative participants find this way of modelling generally understandable, and that in some instances, it has the potential to be a particularly attractive and useful option for artist users. While some participant artists praised or found unique representation in the depictions of the body in the tool, others criticised the tool's departure from the normative body. The randomness and serendipity of the tool allowed some users to explore novel ideas and create 3D human figures digitally which they had not been able to create using other platforms, but the potential of the tool as a vehicle for serendipitous discovery requires further exploration. Likewise, the possibilities of the tool to affect and stimulate creativity in artist users, and to be integrated as such into artistic practice, present exciting and fruitful possibilities for alternative depictions of human bodies in digital space.

CHAPTER VI MAKING UP BODIES: THE TOOL IN PRACTICE

CreatorCustom provides a novel experience of modelling 3D human figures, as reflected in the range of responses to the formal and interactive qualities of the tool by participants in the user workshops. The perspectives of the participants, and my experience of watching them interact with the tool and listening to them describe their interactions and the figures they created, helped me to more clearly contextualise what the tool offered my own practice, both in similarity and in contrast. Haraway writes, “The topography of subjectivity is multidimensional; so, therefore, is vision. The knowing self is partial in all its guises, never finished, whole, simply there and original; it is always constructed and stitched together imperfectly, and therefore able to join with another, to see together without claiming to be another.” (1991, 193) My experience of queerness as it relates to my life experience and my artistic work offered an informal and often half-conscious materialisation of Haraway’s assemblage, location, and subjectivity discourse; by taking in and synthesising the perspectives of others, queer and not, like me and unlike me, I am able to locate myself, my perspective, needs, and limitations, with greater specificity and relational understanding. Understanding these issues in community with others, on a casual basis and through the feedback of those members of my communities I engaged explicitly for that purpose, provides vital opportunities for reflection and further work.

While my engagement with this tool, its development, and its affordances has been more broad than simply considering the impact and relationship of the tool to my work, the connection to my own artistic practice and how the tool is or might be used as part of that practice was the point I returned to over and over during the course of this research. I was interested in gathering data about the practices of others because of a lack of existing data about the choices and relationships of artists to their materials, particularly queer artists, just as I was interested in subjecting the tool to user testing in order to evaluate their experience of using the direct manipulation interaction method for the purpose of modelling a figure, and their perception of the figures they were able to create. Finding an appropriate way to articulate and quantify my own experience of using the tool, and the tool’s effect on my artistic work, required equal care in designing a methodology and structuring an approach which would reflect both aspects in appropriate measure. Given these priorities, documenting my use of the tool through

recordings and immediate textual reflection about each individual experience of using the tool in the form of a diary offered a balance of providing data over time which could then be analysed and reflected upon further. Likewise, the use of descriptive formal analysis of the figures I produced using the tool would centre my artwork as the outcome of the process and allow me to articulate the change between my previous work on the body and the forms that I am now able to use in my practice.

In order to acclimate the reader to the context of my artistic work during the research period of this project, this chapter begins by discussing the role of prior tools for modelling 3D human figures in my artistic work, and the transition of my conceptual and representational relationship to the body as an artist in parallel to the course of the research and development process. I will then discuss the diary I kept of my use of the tool in my artistic work from February to June of 2020, including the methodology and the data collected, from the diary text itself to screen recordings and the figures produced during my use of the tool. My feelings of relief and inspiration when using the tool, as well as references to the relationship between my role as an artist and as the software's creator, as represented in the diary text, and my experience of using the tool to explore ideas are then elaborated on in detail. These themes are analysed and discussed in terms of the gendered aspects of my relationship to technology as a practitioner, the affective level of my user experience when engaging with the tool, and, more broadly, affect as a potential space or metric for engaging with users and user experience design. This discussion ends by considering the role of the tool in providing serendipitous and exciting results, such that I was able to move my own artistic work toward a paradigm of representation focused on the experiential and abstract representation of the digital body. This chapter finishes with a formal analysis of the figures I produced while using the tool, discussed in comparison with my own previous work and in relationship with relevant contemporary and historical artistic context.

6.1 The Past Body: Use of Previous Tools and Forms

During the period of research preceding the development of CreatorCustom, I had continued to use existing tools in order to create 3D human figures which I then used in self-contained videos and larger multimedia artworks and installations. My use of the tool had initially been the sum total of my use of 3D modelling, exported for immediate use as a static object in programming environments. From there, my growing competence with general 3D modelling facilitated a process by which I would conceive of an idea for a work, use a standalone human modelling tool in order to create the figures to be used in the work, and move on to perfecting their forms through modelling or adding extra meshes, and finally animating them and producing video clips, which I would edit together to create longer works or present singularly, looped. As such, and in contrast to CreatorCustom, I was not using these tools

primarily to derive inspiration or ideas for ongoing or future work, but to execute well-planned and conceptually developed ideas quickly and accurately. There are several notable pieces or series of artwork which I produced during this time which illustrate my approach to the body in my work preceding my use of the tool, and which, taken together, illustrate the progression of the ideas which informed this approach over time.

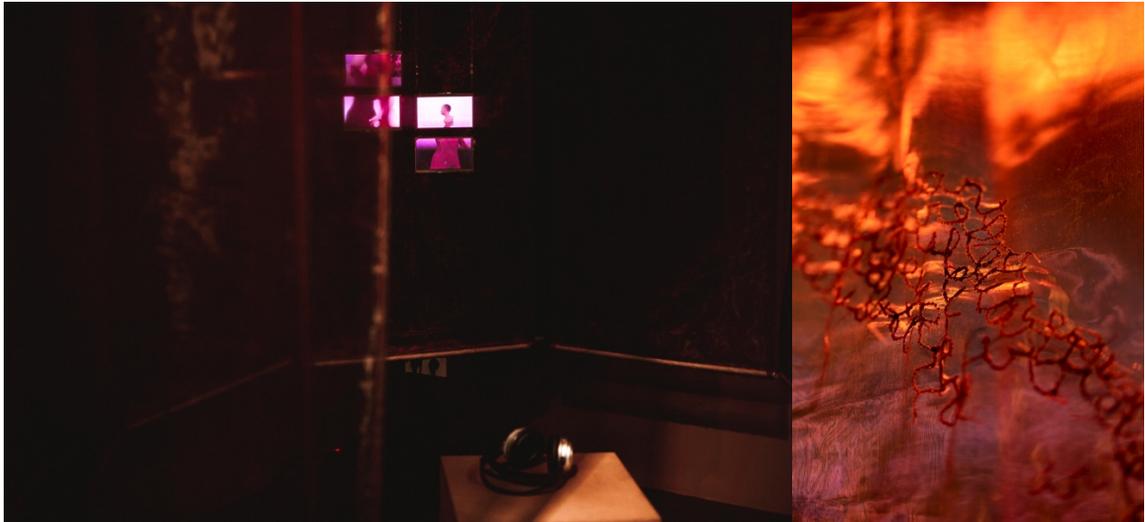


Figure 22: *Planned Irrelevance*, 2018. Installation. Left: Detail view of the installation showing the display screens, seating, and headphones from outside the fabric enclosure. Right: Detail view of the embroidery on the enclosure. Photograph: Left: Jo Pollux, Right: Judy Landkammer

The first such work, *Planned Irrelevance* (2018), is a multimedia installation produced for exhibition at the Schwules* Museum²⁷ in Berlin, Germany. The installation was composed of four small digital display screens, suspended from the ceiling, and arranged off-centre and parallel to one another, inside a circular enclosure of translucent, textured red fabric panels with an embroidered waterline slightly less than two metres off of the floor (Figure 22). On the small screens, animations of five separate figures play, interacting with one another sensually and sexually, and move through and float on endless gentle waves of reddish purple water. The series of animations are looped asynchronously, with an accompanying spoken word audio track interspersed with the sound of gentle waves. The title of the piece references the concept of planned obsolescence, whereby consumer hardware is produced to become rapidly unusable and must therefore frequently be replaced, combined with ‘irrelevance’, which I use in this instance to refer to Ahmed’s (2015) critique that “women encounter the universal as a wall when we refuse to become relative”. Relativity in this context references becoming relative to men as the universal, either in a familial or romantic sense, a relationship without which women “disappear”,

²⁷ This piece was included as part of *EXTRA+TERRESTRIAL*, an exhibition by COVEN Berlin exploring and reclaiming the figures of the witch, the alien, the cyborg and the monster as representations of lesbian, bisexual, and queer women’s identities. This exhibition was produced as part of the *Year of the Women**, a year of programming at Schwules* Museum highlighting the artistic and creative contributions of women to queer art and culture, and to redefine the goals of the museum with regard to broader representation of the LGBTQ+ community in Berlin.

and which, I extend, renders women and those read as such irrelevant to the concerns and functions of such a society. The spoken word audio track, part infomercial, part guided meditation, encourages the viewer to consider the possibilities of self-contextualisation and disappearance from normative society, ultimately asking, “Have you planned for your irrelevance?”



Figure 23: Still from *Planned Irrelevance* (animations), 2018

The figures used in *Planned Irrelevance* are represented using a broadly realistic aesthetic common in contemporary video games and other digital media which uses highly detailed 3D human figures. The material skins are detailed, with detailed and appropriately coloured details, including body hair, nipples, belly buttons, finger and toe nails, and facial features. The five figures have a range of skin tones, physical features, including height, size, and build, genitalia size and shapes, and other physical features. Small details differentiate the figures further from one another, with tattoos, scars, and other skin markings prominent in certain views used in the final animation loops (Figure 23, Figure 24 Left). Most prominently, though, the figures each have inorganic appendages, varieties of coloured tubing, small LED lights, and circuit boards which appear both enmeshed with their organic forms such that they are inextricable, also expressive of the figure’s personality and physicality, and implicitly self-created. Their function as such is unclear to the viewer, but appears specific to the environment in which the figures exist, enabling some aspect of their continued existence as humans without visible evolutionary adaptations in a primarily aquatic environment. Along with the red-tinged light, the effect is one of a dystopian utopia, in which the women cyborgs are able to survive, have sex and intimacy, and create their own meaning, rituals, and forms of care with one another.



Figure 24: Stills from *Planned Irrelevance* (animations), 2018

The forms of the figures remain mostly intact when they are flesh-coloured, fusing with one another only through intimacy and sex acts, in which hands, tongues, breasts, genitalia, and their technical adaptive material elements combine and overlap. However, at certain points during the looping reels, the bodies take on another material appearance, at some moments similar to highly reflective chrome metal, or translucent, as though made of plastic or thick glass, refracting light through the various unified shapes of the body (Figure 24 right, Figure 25). In some iterations of the scenes, of which all loops contain some multiples, often from different angles, the same figures are represented using only these materials, depicting figures which appear to be one structure, moving together and made from the same basic element, undifferentiated and single-minded (as in Figure 24 right). In others, only one figure in a pairing or group changed from the “realistic” skin textured base, often flashing between skinned and inorganic material states, as though marking an emotional or sexual state or shift in consciousness. These changing relationships and material states signal the relationality and connectedness of the figures to one another, though the bodily forms of the figures remain separate and able to be differentiated after momentarily melting into one another.

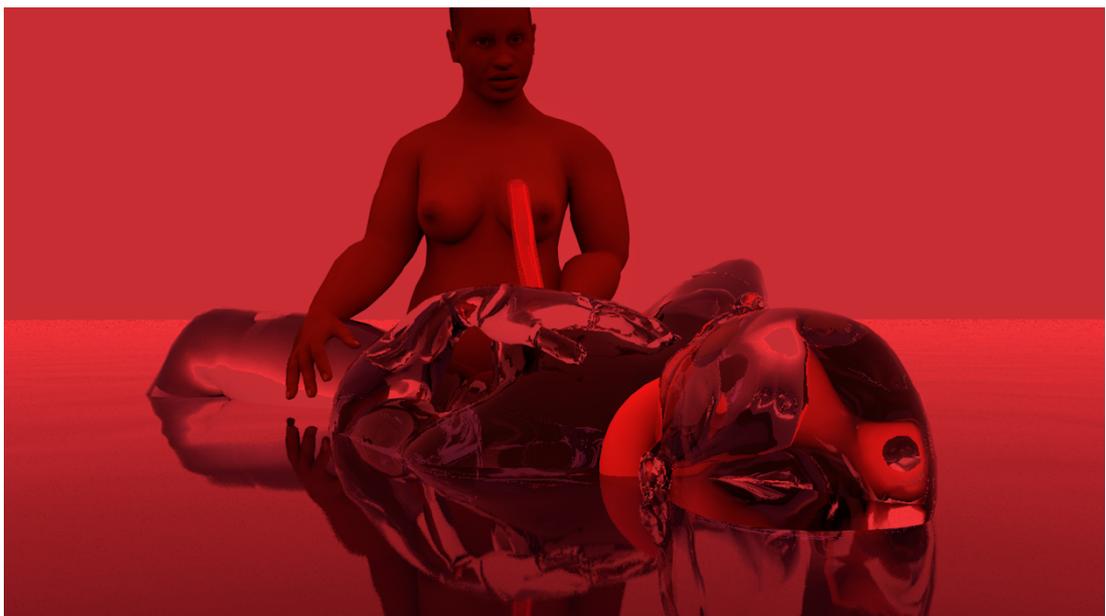


Figure 25: Stills from *Planned Irrelevance* (animations), 2018

Another notable artwork with respect to the body which I created during this period is *Dr Self* (2019), which was included in a pop up installation by COVEN Berlin which questioned ableist, cis-, and heteronormative biases in contemporary medical care through a series of participatory performances which parodied medical exams and studies.²⁸ The artwork, a 15-minute-long video piece, combined onscreen text in English and German with a simple graphic of a 3D modelled figure body, on which a pink translucent material was used to create a visual effect similar to thick, hard plastic or resin. Backed by a track of generic relaxing sounds of waves and natural audio, the video is a guided self-assessment video, similar to a meditation, which asks the participant questions about their desires, sexual and reproductive health priorities, and physical and emotional experience of their bodies in various scenarios. The figure, shown fully in frontal and side views at the beginning of the video, is used to reference particular areas on the body for the viewer to consider, similar to informational videos about medical conditions, and is then used to punctuate the questions asked to the viewer during the latter part of the video. This section of the video zooms in on the figure's pelvic area, and the figure rotates slowly at the waist, moving past a rotation which would be physically possible at a pacing similar to gifs and similar graphics which guide the viewer through timed breathing exercises for anxiety and other conditions (Figure 26). When the piece was shown in Berlin, it was staged in a fully functional gynaecological exam room, and the viewer was seated in the chair as during an exam in order to watch the video on the monitor alone; in other versions in gallery spaces, the piece was presented on a tablet with headphones in a secluded part of the space.



Figure 26: Three stills from *Dr Self* (2019). From left to right: text reading “What gives you pleasure during these events?” in English and German, the body facing the viewer, the body fully contorted

Dr Self uses a singular 3D human figure, which takes on the form of a visual representation of the human body in a broad sense, such that many different viewers are able to engage and identify with it, as in an informational or instructional video. In the first part of the video, the body is primarily static, shown in still images with animated graphics superimposed to indicate relevant areas. While the overall shape of the body is relatively normative with broad hips and thighs and large breasts, certain details, such as changing genitalia and other more subtle physical characteristics, as well as the material of the

²⁸ The series, titled *Proband Werden* (German for “become a test subject”, the language used in advertisements to recruit medical trial participants on public transportation), was staged three times, twice in gallery spaces in Karlsruhe, Germany, and Madrid, Spain, and once in a feminist sexual and reproductive health clinic, *ProFamilia*, in Berlin, Germany, as part of a city-wide performance art festival.

figure, signal a more amorphous relationship of the body to its wholeness, with its form visibly representative of a state beyond literal human physicality. In the second part of the video, the body rotates a full 180 degree turn at the waist and back to its original position between each question posed to the viewer (Figure 26, centre and right), giving them time to consider the question before moving on. The innate strangeness of a human form turning in a way which is beyond physical possibility provides an element of discomfort in identifying with the figure body, which is highlighted by the slow and deliberate pacing of the figure's rotation. The repetition of this gesture has the effect of desensitising the viewer over time to the strangeness of it, in addition to encouraging them to breathe along with the figure's movement, inhaling on the initial twist and exhaling as the figures turns back toward the viewer.



Figure 27: Two stills of an animated gif of a figure bending at the upper spine and shoulders, such that the head enters the upper stomach area and the arms rotate symmetrically toward where the head was previously located

Finally, I created a series of short animated gifs over the period between January 2019 and February 2020, first for my own practice and exploration, and then to be used in COVEN Berlin's monthly newsletter, *A Thing that Feels*. While I often produce these gifs on a schedule so that they are able to head the visual and textual content of the newsletter each month, the content is entirely at my own discretion, and I use this opportunity to regularly explore movement, gesture and emotion with animated 3D human figures in three to ten-second interval loops. Several of the figures and animations I produced for this purpose over this time period provide notable examples of the development and exploration of these themes. The first depicts a teal blue, slightly transparent, matt figure with round breasts, thighs, and stomach, from the upper thighs up and facing the viewer, rotating at the upper spine, so that its face enters its upper stomach and its shoulders rotate almost 180 degrees to point downward, with its arms slightly bent at the elbows and hands parallel with palms outward, framing the area where the head was previously (Figure 27). Owing to the figure's slightly translucent material appearance, the head remains visible in silhouette as it moves through the body's core, and the overlap between the shoulders and the breasts affords greater visual definition to their combined shape. The contortion of the arms and hands, in particular, recasts the body as a semi-alien shape, less obviously human and more sculptural or animal in appearance as the figure completes each looped action, afterward reverting to a recognisably 'human' form.

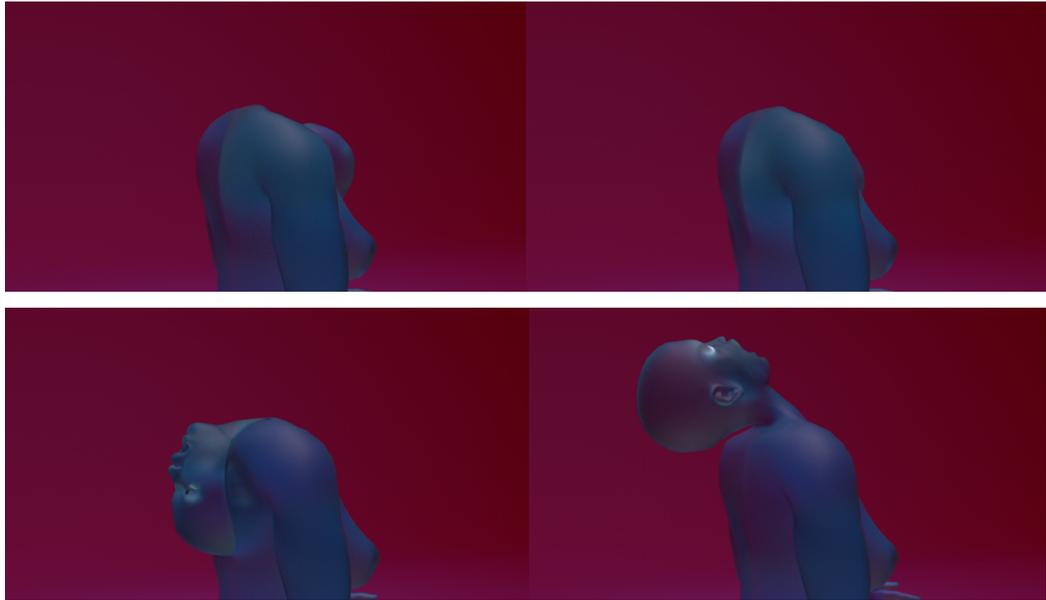


Figure 28: Four stills from an animated gif, depicting a figure bending forward at the neck so that the head enters the upper chest, appears through the upper back, and rotates back to its original position

The second gif discussed here depicts a slender, blueish figure with a visible breast and dark nipple on a reddish pink background, viewed in a three quarter view from slightly behind the right shoulder. The figure rotates its head from the base of the neck forward, so that the head enters the upper chest face-first (Figure 28, top left and right). The slight translucency of the figure enables the viewer to see a slight detail of the head moving through the chest, and the face then exits the back, chin up and mouth open, rotating back to a fully alert head and neck position (Figure 28, bottom left and right). The openness of the mouth on exit causes the figure to appear as though it is gasping or screaming, angry or in pain, and the rotation of the neck and the face, which appears only to the viewer upside down when exiting the back between the shoulder blades, suggest an uncomfortable or painful repetition. In the third and final gif referenced, a dark blue figure on a black background is depicted facing forward, from the upper chest to the hips, with its arms slightly bent at the elbows and hands moving inward toward one another and the torso. The hands, with fingers pointed inward, make contact with the torso at the pelvic area, entering it as though dipping the hands into still water (Figure 29), and make fists inside the pelvic area, visible in silhouette. The clear permeability and textural incongruity of the figure with that of a self-contained and separable body is highlighted by the movement of the figure's hands, while the movement of the fingers toward one another is at once stiff and asymmetrical, visually highlighting their relationship to the torso further.

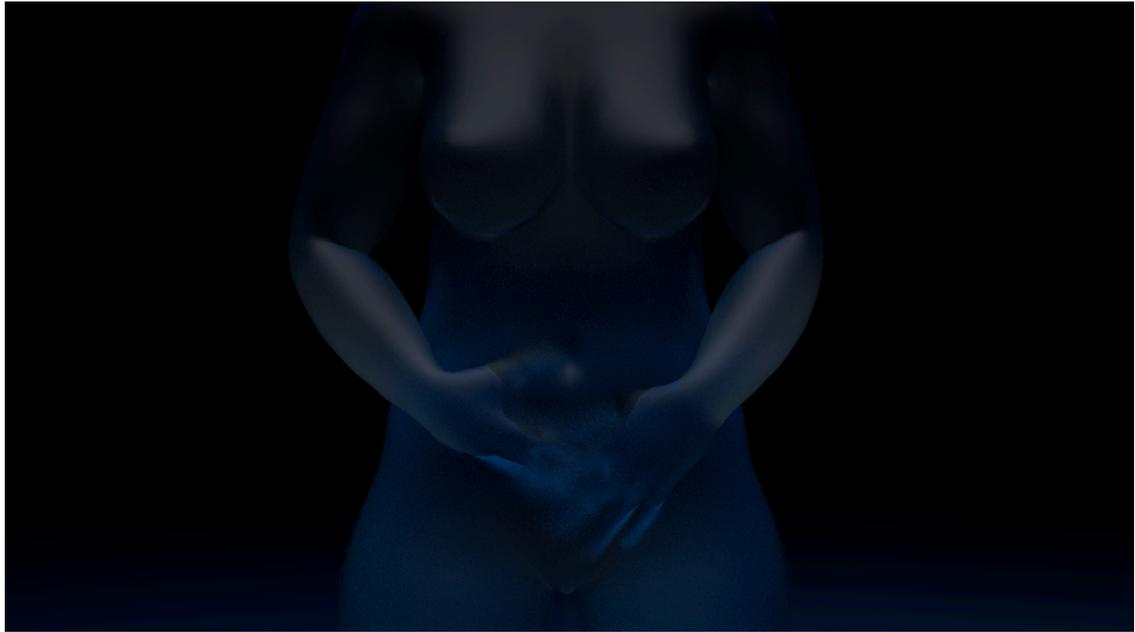


Figure 29: A still from an animated gif, in which a figure inserts its hands into its pelvic area and draws them out slowly with fingers spread apart

The change in the roles, representation, and intended purpose of the figures present in the progressive chronology of these artistic works is marked. The figures in *Planned Irrelevance* are visually realistic representations, near-characters though unnamed and taking part in a non-linear, looping narrative. They illustrate different facets or possible iterations of the conceptual motivation of the piece, available for the viewer to identify with and to project themselves onto, representing a collective refusal to become “relative”, in Ahmed’s usage (2015). However, the figure bodies are clearly separate from the viewer, and invite the viewer to identify primarily with the larger concept, rather than their own physicality or embodiment. While their bodies are clearly cyborg in nature, and their organic bodies and the inorganic matter of their adaptations are integrated, they are also distinct, challenging but not ultimately fulfilling the escape from the dualism of nature vs technology that Haraway describes as the ultimate salvation offered by the cyborg body (Haraway 1991). In *Dr Self*, conversely, the figure is singular and unspecified, a tool to facilitate and encourage the viewer’s engagement in the artwork through their own body, in terms of focusing on particular areas and matching their breathing to the figure’s rhythmic movement. In the gif series, meanwhile, the material affordances of the figures as mesh-based digital 3D objects comes to the fore, in which the figures’ ability to be animated and stretched beyond the boundaries of lifelike representation is central to their expression of physical discomfort and extended embodiment through movement and form. From February 2020, I used the tool I developed during the course of this research to create 3D human figures to be used in my own artistic work, continuing this trajectory of development of the figure in my work. This process of use and integration, and my experience of using the tool, is documented in the following sections.

6.2 The Tool in Practice: Methods and Data Collection

For the purpose of documenting my use of CreatorCustom in my own art practice in a more circumscribed and intentional manner, I kept a diary of my use of the tool over several months. While many parts of this document include autoethnographic material, drawn from my own memory, ephemera, communications with others, and technical blogs, recording my thoughts after using the tool provided valuable insight into my experience of using the tool as an artist, rather than as a researcher or developer. Autoethnography, an approach to documenting one's own activities, usage, and experiences commonly used across a variety of qualitative social science and humanities disciplines, is less widely used in Human-Computer Interaction, outside of explicitly design-centred contexts. My goal in approaching autoethnography in this context was to gain further insight into and documentation of my experience with a tool I had already designed, so approaches to autoethnography for the primary purpose of assessing my activities to inform design outcomes were less useful. Still, Höök's (2010) autoethnography of her experience of learning to ride on horseback in a new style, applied to experience-oriented design, provided a clear example of video documentation and reflective writing in a HCI context. More recent examples like Lucero's (2018) autoethnography of two periods living without a mobile phone, documented through ephemera, retrospective accounts, reflections, and fieldnotes, which seeks to articulate the experience of living without a mobile phone itself rather than to provide usability or design guidelines based on the experience, were also instructive. Cain and Trauth's (2017) narrative autoethnography and analysis of the factors relevant to Cain's experiences and entrance into the IT workforce as a Black man, Faste's (2017) reflective autoethnographic approach to documenting his physical iterative design process, and Bickel's (2005) critical autoethnographic reflection on her own art practice over a period of years were also further reference points in considering which data to collect and scrutinise, while Dare's (2010) use of diary content in her thesis provided an example of the integration of this data into narrative. Additionally, general texts on autoethnography, like *Autoethnography: An Overview* (Ellis, Adams, and Bochner 2011), were consulted for further information on autoethnography's use in other disciplines.

Based on these examples, I chose to keep a diary of my interactions with the tool over a four-and-a-half month period from February to mid-June 2020 (for the full diary text, see Appendix H), and I also recorded my screen from the beginning to the end of each session in which I used the tool during this time, resulting in 16 documented sessions of between 10 minutes and one hour using the tool. I started each screen recording as soon as the program launched, and continued to record until I had saved the figure I was working on and closed the program. Immediately after saving the screen recording, I opened the diary in a document in Microsoft Word, and recorded my experiences, thoughts, and feelings about using the tool on that particular occasion. These records are a mix of descriptions of modifications I made to the figure, the experience of using the tool to make artwork, notes about

aspects of the tool which were not working and ways in which they might be fixed or further developed, and broader feelings about the tool, relating it to my practice, previous experiences with other tools for modelling 3D human figures, and relevant instances and themes. During the process of writing the short diary entries, I used the screen recordings to refresh my memory about particular moments during that modelling session, such as reviewing my interaction around a point where I made a significant or notable change to the figure body. I also used the saved 3D model I created in a similar manner, to keep fresh in my mind the final figure I had created, especially when compared to the figure I started with in the screen recording.

This approach was modelled specifically on Lucero's (2018) use of reflective writing and immediate textual documentation of relevant experiences in his second period of living without a mobile phone, and Höök's (2010) use of video to observe her own movements, which I replicated by writing a textual reflection immediately upon finishing each period of work with the tool and by recording my use of the tool continuously on screen. Faste's (2017) and Bickel's (2005) use of the products of their respective design and artistic processes to reflect on those processes were instructive in considering how discussion of the figures produced by the tool in a formal sense might be integrated with autoethnographic texts more similar to those HCI examples produced by Lucero (Ibid) and Höök (Ibid). Finally, Lucero's use of retrospective accounts and ephemera to document his first experience of living without a mobile phone, and Cain's (Cain and Trauth 2017) reflective account of his own life experiences provided guidance in incorporating reflection into autoethnography when the events being reflected upon were not contemporaneously documented in a systematic or intentional sense. Ultimately, the approach I chose allowed me to track my individual experiences with the tool as an artist over time, identifying both individual moments and patterns in the diary text, my use of the tool as documented through screen recordings, and in the figures that I produced. While further information about my process might have been obtained by recording my interaction with the tool using a camera or through audio recording, I was aware that such recording was likely to disrupt my process through awareness of being recorded, and I chose to report my experiences in this sense retrospectively, so as to allow my artistic experience of the tool to more closely reflect my normal practice. One sense in which this documentation might have been improved upon is by having recorded my prior experiences with previous software tools and/or with general 3D modelling tools using the same protocol, which I was instead only able to do through recollection of my own experiences and difficulties using those tools after the fact.

Given that the period recorded in these diary entries and screen recordings followed chronologically on the user workshop study documented in Chapter 5, my experience of using the tool was influenced not only by my experience of developing the tool, but also by my experience of testing the tool with other artist participants. Indeed, I reference points made by participants during several entries in the diary, and since I was analysing and coding the data in parallel to my art practice during this time, it is

clear that this experience influenced and informed my own feelings and perspective on the tool. In a similar sense, my account of using the tool in my practice is influenced more broadly by the period of time in which it was written, when I was also writing other sections of this dissertation, an arduous and often tiring process which impacted my desire and ability to engage with my art practice regularly, and during the COVID-19 pandemic, a period in which I have been socially isolated, living hundreds to thousands of miles from my partner, and my chosen and biological families. As such, this account is one of my use of the tool under a particular set of circumstances, which influenced my feelings and experiences in some tangible ways which are visible in the text, and, likely, some less tangible yet inextricable ways. This is not documentation of my art practice using this tool which I researched and built over the course of multiple years under ideal circumstances, but rather, in the circumstances I experienced; often tired, frequently juggling multiple responsibilities and concerns, and continuing to use art and practice to process, unwind, and make meaning.

6.3 Data Analysis

The diary text itself was analysed and coded using the grounded theory coding process described by Kathy Charmaz in *Constructing Grounded Theory* (2014). During the initial phase of coding, relevant and repeated references were coded into ten categories, describing feelings, from relaxation to annoyance to inspiration, my interactions and attitudes toward the figure bodies I was modelling, and the relationship between my mindset as an artist when using the tool and my role as the developer of the tool (Table 9). After the initial codes were completed, the focused coding period involved coding each of the initial categories for repeated or notable themes within those initial categories (Table 10) (for a full list of codes for this study with examples, see Appendix I). I wrote memos after the second coding period describing my initial associations and thoughts about the coding process and the concepts arising from it, with all coding and memo-writing completed using NVivo software (QSR International 2015). While the videos themselves were not analysed according to any discrete framework, they were reviewed in order to identify any patterns of behaviour or moments of particular interest. The analysis was conducted so as to allow the diary and documentation to be the primary sources of information which are presented; however, because the document concerns my own feelings and experiences, I am more comfortable than I would otherwise be with providing decisive interpretation where it is appropriate in this instance. The following section addresses and describes the themes present in the diary in detail.

Initial Theme Codes	Example
Balancing artist and developer mindsets	I feel like I'm able to get a little more versatility out of the tool (and maybe that's where it's grating at me a little to not have the time to clean up the parts that are making that harder).
Changes in modelling priorities	I wasn't worried about trying to give it attractive features, modelling it after someone I might find hot in an idealized form, or trying to make a unified whole; rather, I focused on characteristics I found interesting.
Description of manipulations	Today I finally tried the wibbly, flowery effect that one of the full body modifications does when it's pulled to the extreme, and I really, really enjoyed that.
Feeling annoyed	The system does a weird crunching thing to the genitals that I'm not very happy with, but otherwise, I enjoyed this and it was an excellent way to clear my head and let off a little bit of steam after a long day.
Feeling inspired	I have another thing where I ended up with giant hands on this one, which expressively I found really interesting and sought to accentuate. When the first one happened, I was trying to make it disappear, but then I realized that I could make it huge.
Feeling relief	It was really exciting, and a relief to be engaging purely as an artist on some level.
Happy with randomiser results	In this instance, I was pretty happy with the characteristics that the randomizer generated off the bat.
Problems with the tool	It still definitely has a lot of problems. Many of the drag functions don't actually work in the directions that they're supposed to, some don't seem to respond well to really light modifications, and the 'back' function selectively doesn't work.
Sketching for the first time	Still: in terms of sketching a human figure, this was a big moment for me. It's the first time that I've felt like I was truly sketching, rather than modifying someone else's 'barbie'.
The figure	Even though the model and I are different shapes, it made me think of my own body and how different parts of my body are approximately that symmetrical. Similar, but not the same, and really variable and imperfect.

Table 9: Initial codes and example text

The figure/Child Codes	Example
Abstraction	I do really enjoy the way this effect makes the whole thing look somewhere between couture and body armour, protected, structured, organic, floral. The other, I made the penis very wide early on, which I enjoyed expressively (making a phallic object non-phallic), and played with other aspects of the body, including adding a belly and making the lips wider and the eyes more open. I also stretched the fingers out to match the belly. Then I made the face butterfly shaped by exaggerating the face shape, which gave the whole thing and overall effect of stretching toward the front of the body, floating forward. The movement of the body feels both organic and involuntary, an uncanny valley ooze with some animal and human and neither features.
Allowing underrepresented characteristics to come through	I also felt, though, that the system allowed certain characteristics to come through much more than MakeHuman ever did (fatness, squashed faces, weird nose shapes, rolls here) and I appreciated the lack of symmetry that I built in to the system.
Focusing on feeling	Rather I'm looking at the aesthetic qualities of various parts of the body and feeling them through, thinking about what they communicate emotionally, how they make me feel and how they might make others feel.
Intentionality of appearance	I also pulled both the back of the head and the back out, and I liked the way those two dovetailed together. I moved some other parts of the body around too.
Looks like people I know	I see parts of other peoples' bodies and of my own in modelling figures using this tool, and I also see my own emotional expression more clearly.
Not focusing on the whole body	I apply a modifier if I want to and if I like the way it looks, but I'm not focused on the label per se or necessarily always on the "whole" body.
Not too perfect or precious	Even though the model and I are different shapes, it made me think of my own body and how different parts of my body are approximately that symmetrical. Similar, but not the same, and really variable and imperfect.
Tool not interested	I also made the legs a bit rounder and sort of tried to make them more symmetrical, but enjoyed how much these two weren't interested in that and how complementary they ended up being; both similar and different.
Undesired characteristics	I then went about making it less of a conehead shape;

Table 10: Focused codes and example text (excerpt), The Figure

6.4 Data and Results

6.4.1 Feeling Relief

The diary content makes clear that a major theme in my experience of using the tool in my own work was a feeling of relief, of “a relief to be engaging purely as an artist”. That this relief is particular to engaging *purely* as an artist is contextualised further by the association of these statements with a lack of anxiety about technical precision when engaging with the tool. This feeling is primarily connected to my prior engagement with the tool on multiple levels; as a user who experienced disappointment and discomfort when using similar tools previously, as a developer evaluating my own creation and changes, as a researcher studying the responses of others to using the tool, in addition to considering the tool as a factor in my artistic work. While these mindsets and experiences sometimes intruded into my use of the tool (discussed further in the Balancing Mindsets sub-section), it is also clear that I relished the opportunity to take some distance from this role, in which I describe my thought process toward the results of the tool as primarily, “Okay, that’s nice, but could it be better?” I also felt a degree of relief in stepping away from general 3D modelling tools for the initial stage of modelling, where, as I described in the diary, I often feel a need to focus on not making technical mistakes, performing a series of steps such that the figure and anything I produce based on it is technically sound; not doing so can sometimes mean hours of lost or functionally pointless work, leading to not being able to animate or otherwise use the figure in the way I had intended to. As such, though this process can be artistic and is certainly something I engage with freely as an artist, it is also less conducive to casual, playful, or undirected artistic interaction in my practice, and draws on technical skills which I use heavily in non-artistic areas of my working life. Since this tool produces technically usable figures regardless of their appearance, I could be reasonably certain that the only impediment to me using a particular figure I produced with the tool was my own aesthetic evaluation of it and desire to use it to create further work.

Taking off some technical pressure, in terms of engaging with the tool and my art practice in 3D modelling, produced a feeling of comfort and an opportunity for immersion in the process of creating 3D human figures which had not previously been part of my experience. The degree to which using the tool to model produced a feeling of comfort for me as a user was connected to feeling able to engage with the tool casually, and to not put pressure on myself or the process to produce a particular result, beyond my own desires. At times, certainly, a mismatch between my own desires and the output that I produce might cause or exacerbate negative feelings or frustration, but when using the tool, my focus on exploration of the tool’s capabilities and results, and a feeling of release from many of the conventions of 3D modelling, provided achievable, and, often, enjoyable goals. On 26 April 2020, I wrote, “I find this to be a very complete sculpture, minus posing. It feels balanced, detailed and unique

and I appreciate getting that kind of result with about 20 minutes of work. I feel able to be flexible with my goals and creative without putting a lot of pressure on myself.” An aspect of my satisfaction with the tool in many entries connected to the length of time spent modelling, where I was able to produce results which felt interesting, substantial and meaningful in a relatively short amount of time. I also describe satisfaction at being able to listen to music while creating, which I am not normally able to do comfortably when using digital 3D tools, stating that when using the tool, “I can just be creative and not focus so hard on creating”. This experience of immersion in the moment of using the tool is also reflected in a phenomenon I noticed, wherein there are often minute-long pauses in my interaction with the tool. During these moments, I was typically pacing around the space, looked at the figure, sometimes rotating it, pacing again, and then continued modelling, lost in the experience of sketching in such a way that I was unselfconscious about the long stagnant gaps that this would create in the recordings. This experience, similar to that of sketching or early brainstorming in other media, will be discussed further in the following sub-section.

6.4.2 Sketching and Suggestion

When describing using the tool for ‘sketching’, a term which I am using to refer to the early-stage, exploratory process of art-making either prior to or not yet connected with a goal-oriented artistic project or work, I wrote, “It’s nice to go back to a more casual, less pressured way of making art where I don’t feel bad about myself so often.” The sentences preceding this one discuss my bad feeling with the tool as associated with a pressure to maintain a standard of technical proficiency and execution at all times, which, when lifted, resulted in the feeling of relief described in the previous sub-section. Indeed, that this removal of both perceived and actual technical pressure toward precision likely facilitated my experience of the tool as useful for sketching, which I described on 24 February 2020 as something I had missed since moving my practice primarily to digital media. During this time, I articulated having used other materials, particularly physical collage and embroidery, in order to access similarly low-stakes creative expression, since I had not found anything like this experience in a digital context, or at least, which felt satisfying and relevant to my own creative aims. As such, the feeling of relief that I experienced when using the tool appeared to result directly from the lack of technical pressure I felt when using the tool, and the ability to play, to sketch, in the tool, as my primary mode of use and interaction with it. This feeling of sketching, and of low-stakes interaction in particular, was influenced by the restriction present in the tool, in which I was only able to create a human figure within certain aesthetic and interactive boundaries, removing a degree of control from the modelling process and allowing for exploration and versatility within those constraints. “This tool creates things that feel really messy and exuberant and strange and I love that. It always feels like to get that kind of stuff I have to work really hard or have the idea in advance and that always ends up contrived, because

it's not what the tools are made with in mind and they grate when one tries to. Or maybe the training does, I don't know. Probably a combination of both.”

The ease, comfort, and surprising qualities of the tool and its output combined to provide interactions and results which sparked further ideas, manipulations, and methods for using the tool to create artwork. At times, the results of the randomiser produced the impetus for these thought and action processes, as in instances where I described either finding that the results of the randomiser reflected certain characteristics which immediately interested me, or in which I chose to base a design on the results that the randomiser provided. I was also able to use the randomiser to explore a variety of characteristics and come to something which I was able to find a connection, or “a way in”, as I described it, which was often drawn from the shape of specific parts of the body and the ways in which they contributed to an overall sculptural form. The process and experience of modelling itself also led me to achieve unexpected results, as in the case of the Low Detail Carve/Round modifier, which results in an overall surface which is “flowy and abstract”, reminiscent of structured couture costuming in the form of small waves across the limbs and torso of the body, when applied at an extreme value. While I had seen this effect before, during the course of developing the tool, during the user workshops, and in previous modelling sessions using the tool as an artist, during the session on 19 February 2020, I used that effect intentionally, and was inspired by the detail of the results to such an extent that I described wanting to make a series of similar figures. Other similar moments, such as widening an ear and achieving a subtle ripple in the surface, or the rolled rounding in the surface in the lower thighs which appears on certain figures, represent similar moments of creative joy and expression which I varied and repeated during other modelling sessions. In other instances, the models that I created using the tool raised broader questions in terms of the figures I was making and the conceptual direction of my work that they might indicate or facilitate, from the ways in which the figures were or might be gendered (by myself and others) to how they related to my own body and sense of my own representation and embodiment. It is clear that interacting with the tool opened up my own ideas about what I wanted to create, and facilitated a sense of serendipity and satisfaction in the results I was able to achieve, an experience I had not had previously when using digital 3D modelling tools.

6.4.3 Balancing Mindsets

As much as my use of the tool in an artistic sense provided joy, inspiration, and development in my artistic practice, it was also apparent that my role as the developer of the tool intruded into my experience of the tool, or at least, into my written accounts of it. Some of these intrusions were simple documentation of errors or issues I encountered, such as the repetition of the “cone head” modifier, which I subsequently toned down the expression of in the tool, or occasional discussions of how the genital modifiers might be adjusted to produce more detailed results. While there were certainly other

venues in which I might have documented notes to myself about changes I wished to make to the tool, there is also value in documenting the issues which disrupted particular modelling sessions or interactions for me as a user. However, my role in designing and developing the tool also entered my textual documentation of my enjoyment of the tool in notable ways. When discussing a bug in the tool's mechanism for saving the figures in its internal system files, which results in some variation in the figure each time it is opened within the system, I said, "It's interesting in that it gives me another variation on the same theme, but I also should try and fix it." The choice to leave that aspect of the tool intact or to change it was and is at my discretion, and it is unclear in the text why I felt that I "should" change this aspect of the tool, whether because it was unintentional, it produces inconsistent results, or another factor. Likewise, I often qualified my enjoyment of the tool with acknowledgement of the tool's imperfections and inconsistencies, as on 17 February 2020 when speaking of a problem with a modifier in the tool, "It's unfortunate and I wish I'd paid more attention to it. Overall, though, the experience of modelling in this tool is still a lot more comfortable." When discussing issues like this that I note within the tool, I explain briefly in the text why the issue is occurring and how it might be rectified in the future, which is unlikely to be for my own benefit; these are issues, mechanisms, and solutions that I am well aware of, after working with the tool and its predecessor system for several years. At times, I also empathise directly with the participants from the user workshops, some of whom found working with the tool particularly annoying or frustrating, or justify my preferences in relation to their own, as when discussing the segmentation of the body according to active zones and the aesthetic results it produces. Thus, it is worth considering the role that my desire to anticipate and explain my understanding of the technological shortcomings of the tool plays in a document of my own artistic practice, and, in particular, my qualification or tempering of my own artistic experiences in relationship to these aspects of the tool and how they are (or might be) perceived by others.

6.4.4 The Body and Inspiration

It is clear that my use of the tool resulted in significant changes to the overall appearance of the figures I create during the course of my artistic practice, and these changes are documented in the diary text. A frequent source of interest for me was the lack of symmetry the tool produces, which is a significant difference from other tools for modelling 3D human figures, in which lateral symmetry is able to be toggled at will by the user. "I appreciated the lack of symmetry that I built in to the system. I think that the lack of symmetry was an aspect, actually, that made the figure feel more 'real'. My body isn't symmetrical visually, and I think that's true for most people[...]" I experienced the asymmetry of the bodies in the tool as more realistic than the results of other tools, comparing it with my own body on more than one occasion in the text, and referencing the lifelike quality that this aspect of the system brings to particular areas of the body, such as the breasts and limbs. On several occasions, I described trying to force the tool toward symmetry, as an exercise in the capabilities and limits of the tool, and

likewise found the near-symmetry that I was able to achieve in working in this manner more convincingly realistic in terms of its representation of comparative areas of the body than the perfect symmetry enabled in other systems. On 16 March 2020, I wrote, “It’s so interesting how much that feels like a mimicry of real life and real body characteristics, even when the overall effect is at times really abstract.” The tool’s intentional tendency toward representation of characteristics not often seen in comparable tools, like large, wide hips and buttocks, rolls to indicate fatness and size, and a wide variety of facial variation and definition, were frequently the individual aspects of the tool which I described deriving inspiration from when modelling, and sought to preserve and accentuate during my sessions with the tool.

While I often wrote about focusing on individual areas of the figure body for the sake of clarity in explanation, I also discussed the figures I produced using the tool as sculptural objects, in which issues like composition, balance, and the spatial relationship of areas of the body to one another were particularly relevant. I described the hips as having “balanced out” the composition of the figure in the modelling session I completed on 28 February 2020, and likewise, describe the energy of the whole figure as creating an effect of “floating forward”, ascribing movement to a static object based on its spatial positioning (20 February 2020). Similarly, I revelled at times in the abstraction available to me in the tool, as on 16 June 2020, when I wrote, “I collapsed the head into the chest. I’ve either gotten that to happen so that it drops away totally out of view, or so it’s kind of in the neck cavity before, but this one lodged a little off-centre between the breasts and it was very cool. I then moved one of the breasts onto the face, covering one eye. The nipple became the eye.” My ability to use the shapes of the body as abstract, compositional elements at will was new, and provided significant avenues for exploration of the body as a manipulatable form, the effect of which on my work I described as “fresh and inspiring”. That my language toward the figure and my modelling activities when interacting with it became more focused on formal language from my previous Fine Art training coincides with narratives of emotional and experiential identification with the figures, and with certain characteristics in particular. After modelling a figure on 30 March 2020, I wrote, “This one feels very the way my body does at the moment; kind of sore and taut and heavy. I have my period at the moment and I’m in a lot of pain in my middle and in my legs, and that’s how that feels, kind of round and achy and shiny. I feel compressed and overflowing and constricted, and my body kind of feels like it’s getting away from me somehow.” I describe a similar phenomenon in making a figure with a giant hand, during a period of time where I was experiencing a strain in my hand and back from computer work, indicating an identification with the figure that is about my physical and psychological experience of my body, rather than faithfully representing my physicality.

These changes to the process of modelling when using this tool, and the style and representational changes afforded to my creative process, shifted the paradigm through which I viewed and engaged in the modelling of digital 3D human figures. Again on 28 February 2020, I wrote, “Human bodies are

so loaded with so many different ideas and norms. My experience has been that it's a form where it's really difficult to get out of these paradigms, even if your personal politics and understanding would suggest otherwise. I spend a ton of time thinking about this and it was still so hard to move beyond being worried about the body not looking perfect. I don't have that option here [...] and it's bringing about a lot of change." My struggle to move past a particular way of conceptualising and representing the body visually, and toward a more expressive manner of representation in my own work, was advanced significantly by my use of the tool, which suggested and enabled modes of representation which were difficult to conceive of without having seen them in this particular medium. In the first diary entry that I wrote after interacting with the tool in order to make art, I stated, when discussing the figure, "I wasn't worried about trying to give it attractive features, modelling it after someone I might find hot in an idealised form, or trying to make a unified whole; rather, I focused on characteristics I found interesting." The extent to which creating work which centres sexuality, and my own sexuality, had previously entailed a focus on the whole body, whether mine or those of others, as a vessel or allegory for representing (and sometimes critiquing) desire through desirability, was upended by the tool's abstraction, necessitating a reconceptualization of how a body might be desirable or indicate and represent desire. In using the tool to model figures, I was able to focus on the sensuality of the body from new angles, playing and manipulating the body and areas of the body expressively, and feeling through modelling, visually, emotionally, and experientially.

6.5 Discussion

6.5.1 Gender, Sexuality, and Minority Experience

In the diary that I kept to record my feelings, experiences, and use of the tool in my creative practice, I experienced clear difficulty at certain points in leaving behind my technical engagement with the tool in terms of development and interaction design, and also noted a pattern of justifying and explaining technical aspects of the work, in a verbose manner rather at odds with the tone and purpose of the diary generally. There are a variety of possible explanations for this, including a desire to make notes in order to remember issues which occurred to me during the modelling sessions, or, indeed, to accurately document my experience of using the tool, in which all of these thought processes were indeed occurring simultaneously, and which reflects my role as designer, developer, and artist accurately. Still, it is worth considering the role that my experience as a woman and a lesbian might play in my own consciousness, and at times, self-conscious emphasis, related to technical aspects of the tool in particular, as well as the way in which I represented those considerations in the diary. The diary, though an accurate reflection of my experience of using the tool as an artist in my practice, was also written

with the knowledge that it would likely be included in my dissertation, and was thus produced with an awareness that it would likely be scrutinised, compared, and evaluated in context of the broader research conducted here.

Much research has been conducted on the decline of women in technology fields over the past 40 years, and particularly, in high-status and technically-oriented roles within these fields, both in academic and industry environments. Kvasny, Joshi and Trauth (2011) found that university students enrolled in IT courses across gender and ethnicity demographics tended to associate technical skills with masculinity, a finding which is well-corroborated by previous literature. Broad negative stereotypes about women's mathematical and technological aptitudes are pervasive in Western cultural settings, as Tapia (2006) notes in discussing the role of such stereotypes in contributing to competitive and hostile work environments, which damaged the recruiting and retention of women at several Dot-Com Era businesses she studied. While Carter and Jenkins (2002) have debunked stereotypes that one can tell the gender of a programmer merely from reading their code, for example, gender stereotypes related to coding and technical proficiency persist. It should be noted that studies which address various aspects of gender and STEM subject areas often mention sexual orientation and disability as a potential compounding factor, these studies do not address these intersections with gender. Some contemporary studies and scholarship does focus on race in STEM subject areas across or along gendered lines, with Rankin and Thomas (2020) studying the experiences and barriers facing Black women as students in computer science in particular.

As such, it is necessary to consider the role that so-called 'stereotype threat' may play in my desire to justify and explain my technical expertise and decision-making in a diary of my artistic practice. Stereotype threat refers to a phenomenon wherein awareness of negative stereotypes about one's membership in a particular group can produce doubt or anxiety when completing a related task, as in a study in which women's math test scores were equal to men's after being told that the test did not show gender differences, but went down significantly both when told that the test did show gender differences, or when given no information prior to completing the test (Spencer, Steele, and Quinn 1999). Indeed, the workshop studies, which I mentioned several times in relationship to technical aspects of the tool in the diary itself, may have provided some specific fuel for discomfort in this area. While the majority of the participants approached working with CreatorCustom in the workshop setting with curiosity and were thoughtful and candid with their feelings and experiences, even when those experiences were disappointing or negative, and provided balanced and constructive criticism about the strengths and weaknesses of the tool in its current form, my perception (or perhaps, fear) that I had made something which others might perceive as technically 'bad' may have informed my desire to explain my understanding and intentions when describing a problem I had encountered in my own work. Likewise, my perception that gendered dynamics entered the sessions tacitly in certain instances, such as in assumptions that I was not involved in the technical development of the tool after

I had directly indicated otherwise, may have produced a desire to anticipate criticism about the tool and prove that I understood the issues at hand and how they might be dealt with; in other words, to prove my technical competence when I perceived that it might be in question.

It is also notable that I did not document a similar phenomenon with regard to my artistic proficiency. In one workshop session, the only one in which I did not reference my own artistic practice in my introduction, participants assumed that I was not familiar with a variety of artistic concepts and terminology, particularly related to human anatomy conventions, and, I would estimate, addressed me accordingly. Rather than finding this bothersome, or, indeed, feeling undercut by it, I appreciated the degree of specificity it provided into these practitioners' perspectives and priorities in terms of representing human figures, since they assumed no background knowledge on my part. The diary, similarly, includes no explicit or particular justification of my artistic skill. However, technical art practice is not presently an area in which women (or, indeed, lesbians) are thought to be particularly lacking in skill or aptitude. Equally, my experiences of gender bias and negative stereotyping related to technical skills and STEM fields more broadly are not limited to the workshop studies or to my experiences as a PhD student, but spread out over a lifetime, from primary school to the present day, and profoundly contextual to my own experience of gender. Landström (2007, 13), in discussion of women's relationships to technology and technical roles, describes the gendering of technology thusly: "Technology is understood as masculine and women's relationships with technology are represented as analogous with heteronormative projections of women's relationships with men." This fixed construction of women's relationship to technology as necessarily fraught in much the same oppositional manner as the construction of heterosexuality, with a masculine and feminine counterpart separate, unequal, and opposite, is necessarily alienating and complex to relate to, both in terms of its sexism and in terms of its incongruity to my own gender.

In light of this distinction, it may be that what enters my consciousness in these instances is a dual sense of myself and my potential relationship to the reader, depending upon their positioning and perspective. At one level, the desire to articulate and clarify my expertise, to avoid the stereotype I perceive myself to be threatened with, is present. Yet there is also a more precise articulation of a difference in goal, a sense in which focusing on research which interrogates and seeks to reimagine the body, the role of the body, especially in digital contexts, and which questions the given paradigms of representation in digital space, has led to specific questions about competence beyond just those which are traditionally gendered. In this sense, competence becomes a tool of more nuanced control over technological expression; after all, since other skilled users are able to express themselves using the tools available, were I indeed competent in the manner that they perceive themselves to be, I would be satisfied with the options available to me, and thus my lack of satisfaction itself reveals incompetence. In this context, when discussing having created a tool which produces abstract figures quickly, easily, and without crashing, a statement of mine like, "It's not perfect, but I've managed to make something

that does do that, and maybe it not being perfect is in fact the point”, might reveal a statement of both competence and difference, in perspective, priorities, and practice.

Landström (2007) discusses uses of early internet technology by lesbians in order to facilitate communication through listservs, new media communication, and hypertext poetry, as disruptive to the notion of a singular gendered relationship to technology, in which lesbians and queer women comfortably adopt technology and tech-centred tasks and roles because it is uniquely useful for our purposes. While Landström does not discuss the idea in her text, it is worth imagining how the comfort of these women might change in relationship to these projects when discussing or presenting them outside of the communities or contexts they serve. The queer experience of modulating one’s self-presentation and expression depending on setting and audience is familiar and can at times be a matter of maintaining comfort and safety under a variety of circumstances. While the diary was primarily a space in which I was able to reflect upon my artistic practice and the tool’s relationship to my practice, it was also an opportunity for me to candidly present my experience with the tool as a designer, developer, and artist. Thus, my qualification of the tool that I produced, the relationship of this tool to conventions in 3D modelling and to paradigms of representation of digital 3D human bodies in particular, and the impact on and role of the tool in my own artistic work, can be read as an intentional and cognisant effort to situate the tool in a document presented with the potential for consumption by a variety of readers, to clarify my own standards, and to articulate my own desires and needs as an artist.

6.5.2 Affect, Normativity, Usability

A presumption that a lack of satisfaction with the affordances and possibilities present in currently available tools indicates a lack of proficiency in those tools (or in the subject area more broadly) is reminiscent of Ahmed’s (2017, 52) description of the queer child in relation to the family: “To disappoint an expectation is to become a disappointment.” She details how the parent’s fear that queerness means their child will be unhappy produces unhappiness in the child, which is thus seen as confirmation that queerness, as feared, is an unhappy state of being. Likewise, the proficiency and contentment of some users is taken by them as proof that those for whom the tool does not produce sufficient results, or who cannot use it effectively for their own purposes, are not proficient and contented due to their own deficiencies and a lack of desire to fix them, rather than because of a mismatch between the tool and the user. While Ahmed names the mandate toward happiness as a straightening mechanism in the context of queerness, it is worth considering how a presumption of a lack of understanding, competence, or technical aptitude might also function as a normative force in determining the roles and uses of tools and their output for users, and the feelings that the user is able to express, at least in a way that is legitimised, about the affordances they perceive. It is clear that I experienced an intense feeling of relief in using CreatorCustom, both because the tool allowed me to

be more playful (I describe using the tool as “playing” or “sketching” on various occasions throughout the text) and less technical (as discussed in the Results section), and because I was able to use the tool to create figures which I found interesting, desirable and which moved my practice forward. However, it is also worth considering that relief in itself, and in relationship to the discomfort I describe in using previously available tools, in terms of the ability of software tools to evoke emotion and produce affective response, and of affect as a potential dimension of usability.

Affect primarily describes a way of understanding and describing emotion, mood, and subjective experience, with different relevance, context, and usage in fields like psychology, critical theory, and gender studies, among others. In the context of affect theory, as is relevant to the social sciences (the usage intended here), the framework of affect has been used to explain, describe, and theorise a range of experiences and relationships, from the public and the societal to the personal and the anecdotal. For example, Kosofsky Sedgwick uses affect to explore feelings related to desire, shame, and illness in relationship to learning and action in *Touching Feeling: Affect, Pedagogy, Performativity* (2003), while Berlant addresses public feeling in *Cruel Optimism* (2011), writing on the affective disconnect between and consequences of aspiring to a ‘good life’ in Europe and the United States, amid the ongoing failure of these societies to provide opportunities for many people to find meaning in their lives. In Ahmed’s usage, affect frequently describes the relationship between values and ideas and their subjects or objects, as in her writing on happiness, where she argues that happiness as a cultural imperative or duty results in a directive toward choices which are thought to produce this happiness, justifying social oppression of deviant individuals and groups and explaining away their unhappiness as self-inflicted (Ahmed 2010). Though affect has a variety of specific usages, contexts, and theoretical foundations, this section uses Ahmed’s framing as a primary foundational definition.

Though standalone tools for modelling 3D human figures allow their users to create complex mesh-based objects with relative ease, they also exemplify stereotypical views about gender, race, and other aspects of human physicality, and these stereotypes have affective consequences for human users who encounter this software system as a creative tool. Certainly, my own experience of using commercially available and open source tools for this purpose was disrupted by the navigation of these stereotypes, avoiding and negotiating their potential role in my work by virtue of using those tools, and considering the impact of this exposure and experience on my creative practice. However, these consequences are not uniform for each individual user; for some artist users, encountering familiar stereotypes about bodies and physicality, including their bodies and physicality specifically, may be a familiar and easily contextualised experience, whereas for others, the stereotypical nature of the depictions, language, and design choices present in a particular tool or environment may not register at all. To explore this experiential difference and its consequences, this analysis will explore affect as a potential area of relevance to user experience, and, in this context, specifically minority user experience, drawing primarily on Ahmed’s concept of ‘encountering walls’ in doing diversity work (2017, 135-142). This

theoretical line of reasoning will be extended in order to question how such walls might impact user experience and usability principles in creative software tools for modelling 3D human figures, and to posit the opportunities of affective experience as an additional metric for understanding usability and creativity support.

The limitations of tools for creating 3D human figures facilitate and prevent a variety of modifications to the figure, coalescing around affording the production of normative human representation within the constraints of the dominant aesthetic 3D modelling paradigm of smoothness and an overall lifelike simplification. These affordances meaningfully affect the output of the tool, as has been discussed at length in previous chapters; if it is not possible to create a figure with particular characteristics, whether physical or stylistic, this prevents users from creating artistic work with these characteristics using this tool, and perhaps, in this medium, if the user is not yet proficient or confident to a degree where that they are able to make these changes using general tools. However, I would also argue that these limitations go beyond constraints on user output, in that they can also cause changes in the artist's affective state and orientation when engaging with them. Though I used existing tools prior to making *CreatorCustom* because they saved time and effort in creating a variety of figures which I could then expand using general software, the limitations, affordances, and language used in these tools recalled violence in the world with regard to racialised bodies, fat bodies, disabled bodies, and with regard to the ways in which bodies are gendered non-consensually and sexualised according to sexist and heteronormative tropes about gendered physicality. These tools are restrictive in their construction of the body in a sense that the physical world can only purport to be, recalling again Butler's (1993, 21) vision of the archetypal white, cis, able, masculine body which forecloses on the possibility of all other bodies, except to the extent that those bodies can be used to further define the legitimacy of the Subject's body through their relational otherness.

For artists who live full time in impossible bodies, what might the affective experience of using a tool which is aggressively normative be? In my case, though I was able to use the tool to produce artistic work, the experience of using the tool was an uneasy one, in which I was not "sketching" but rather trying to approximate ideas which the tool was both unable to fully execute and, in fact, antagonistic toward. This sense of being antagonised by the tool reflected back other moments of similar experience, which reduced my desire and capacity to use the tool, limiting my use to strictly necessary production, without exploration or play. This was not because the tool was not capable of producing results which might be interesting or useful in some way, but because I encountered these tools and their aggressive normativity as a wall. As Ahmed (2017, 136) states, "A wall is what you come up against. It is a physical contact; a visceral encounter." The strength of personal and cultural memory, affect, and emotion called up by the tool's use of reductive labelling, bodily representation, and became a tangible boundary, in that these tools were not designed for me to be able to use. If "Hardness here is a quality of something revealed through an encounter between things" (Ibid, 138), in this case, the user and the system, the

system's status as an immovable obstacle is necessarily relevant to, and might even define, in some cases, the user's experience of that system.

Affect and the affective consequences of software design have been largely ignored by existing usability and human-computer interaction research; when designing creative software for individual use, frustration on the user's part is the affective outcome designers are generally most intent to avoid. This frustration is conceived of, as Resnick et al. (2005) imply, as resulting from making repeated "mistakes", where the user's actions do not achieve their desired results. Interestingly, they also state that stress has the potential to impact the creative problem-solving abilities of users; though in this instance, they are referencing the necessity of the tool to be "pleasurable and fun" to use, it is possible to apply this criteria to a broader range of possible sources of stress in this context. Indeed, these examples articulate a sense in which affect may already be less consciously considered as a component of usability and user experience, and can be expanded in order to encompass the ability of some systems to evoke more complex affective responses. When software tools draw on the explicit relationship between digital objects and physical bodies, with their social and cultural contexts, this has the potential to activate many similar sites of affect, and affective stress, associated with humans, their bodies and their biases, oppression, and subjugation, which the tool is reflecting back to them. This may mean that design solutions which are not loaded with meaning and consequence in other contexts, like using range-limited sliders to simplify complex interactions or parameterising certain characteristics of digital objects, can become evocative to an extent where they become less usable for some users because of what they bring up.

On 17 February 2020, I wrote, "the experience of modelling in this tool is still a lot more comfortable. I'm not focused on the wording or even the parameters so much; I feel more like I'm moving and feeling my way through working with the body, rather than focusing on what the particular parameters are." In this sense, my discussion in the diary of my feelings of relief, comfort, and a relative lack of pressure to produce a specific result can be viewed as reflective of using a tool which did not re-activate sites of familiar affect and exclusion I had experienced in other contexts, an experience I was familiar with having when using similar tools previously. Perhaps because I did not experience the same discomfort, I was able to focus on emotional expression when using the tool I designed, as well as exploration and creativity. Of course, not every user will experience the same difficulty as I did in interacting with other systems for creating 3D human figures; after all, "Normativity is comfortable for those who can inhabit it." (Ahmed 2014, 147) That software tools may include biases of their creators is not new information, but it is worth considering that those biases may affect creative expression and creativity on a visceral, affective level, especially for users for whom the context and subject matter addressed by the tool may be particularly fraught. Such users may perceive such a system as hostile to them and respond accordingly, and that is valuable information to be aware of when designing for user experience, especially in an artistic sense, where identification with one's processes, tools, and products

may be at times especially affectively inflected. Rather than assuming the inherent affective neutrality of a creative tool, particularly one for creating digital human bodies, one might imagine what a tool could evoke for users, not only in terms of negative affective consequences, as described here, but affective possibilities, afforded by opening up new experiences and methods for creation and discovery.

6.5.3 Suggesting and Co-creating

The possibilities opened up by the tool for my own creative work were not only emotional or affective, but tangible and visible in the formal changes and new directions of my artistic work using 3D human figures. When describing the “messy and exuberant and strange” figures I am able to make using the tool, I state that trying to create similar results in general 3D modelling tools often lead to results which felt “contrived” in the past. Indeed, this was a repeated feeling that I had experienced in trying to create figures which allowed for representation beyond the conventions of 3D modelling tools by modifying the mesh itself in sculptural ways. It was difficult to move past a sense of judging each individual action, which, without disruption to the form of the figure on any wider level, appeared cartoonish and obvious, often after relatively great time investment in general 3D modelling tools, which had the effect of discouraging further exploration. Instead, I explored ways of creating additions to the body, communicating an assembled identity through meshes which depicted imagined hybrid technological and organic forms, or by using the movement of the figures to show gesture outside of the range of possible human physicality, rotating body parts through one another or twisting the body beyond its structural constraints. I experienced difficulty in conceiving of forms of representation that I had not yet seen, at least not in digital 3D modelling. I maintained a continuous relationship to my previous modes of creation, building in small elements and new ideas, changes in the figure’s material and textural appearance, small elements of narrative development, but never quite disrupting the underlying figure’s paradigmatic form.

When discussing their intentions for serendipitous suggestion for artistic drawing, Willis and Hina (2009) describe creating “a visual sketchbook and exploration tool that can contribute something to artist creativity as opposed to just productivity”, by taking away some control from the user in the early stages of artistic process and allowing surprising and often unintentional results to come to the fore. Likewise, Resnick et al. (2005) emphasise the advantages of rapid, iterative prototyping in creative work, and the ability to try out a particular design and change or backtrack quickly and easily if desired. It is clear that CreatorCustom has been a successful and fruitful addition to my practice in both of these senses. On 19 February 2020, I described the tool as moving my practice away from the perfection of the body dictated by other tools, saying, “That perfection is totally shattered; even if I want to make it ‘perfect’, I sort of can’t, or rather, the amount of effort that it would take to do so isn’t really worth it.” At other times, I mention the tool’s facilitation of “casual” and low-stakes engagement, producing

figures which inspired further questions for ongoing work, new forms I had not previously considered, and helping me to create figures with which I was able to identify and use to express a variety of initial concepts, physical experiential feelings, and emotions. The range of modifications that are possible in the tool, from small facial details to larger, more structural changes, such as extreme limb resizing and collapsing the overall form in on itself, or using the “flowy” muscular modifier at its most extreme extension, allow for a balance of control and surprise in the appearance of the figure and the overall composition. Creating a tool, and a form of interaction within that tool in which, as I wrote on 16 June 2020, “I get to play”, has advanced the sculptural and expressive qualities of my work quickly, into visual and formal representation which I had not seen or imagined, and which previously felt unimaginable.

6.6 Bodies, Creations, Creating: New Forms

During the sessions documented in the diary text, I produced 18 unique figures for use in further artistic work. The figures produced while using CreatorCustom are markedly different to those which I had incorporated into previous installations and animations, with abstract bodies and body parts guided by serendipitous discovery and expression dominating the overall representational landscape of the figures produced during this period. Some figures created using the tool are more similar to those produced using existing software tools for modelling 3D human figures, with notable differences visible in the form that the body’s fatness takes, in the evident asymmetry of the body, or in details of the figure’s face, limbs and genitalia. However, other figures created using CreatorCustom break the mould of the 3D human body, inserting geometric and abstract forms into its structure and creating overlaps and adherences within the mesh body which transform the coherence of the figure’s human body into a new hybrid visual form. In order to illustrate and further discuss the forms that the tool enabled me to create in greater detail, this section will discuss a select group of figures produced during the modelling sessions recording in the diary entries in detail.²⁹ This discussion will address the formal qualities of the figures, presented in comparison with my previous use of 3D human figures as described in section 6.1, and, where appropriate, in relationship with relevant artistic and theoretical context.

²⁹ For full documentation of the figures created during the sessions recorded in the diary entries with reference images, see Appendix H.

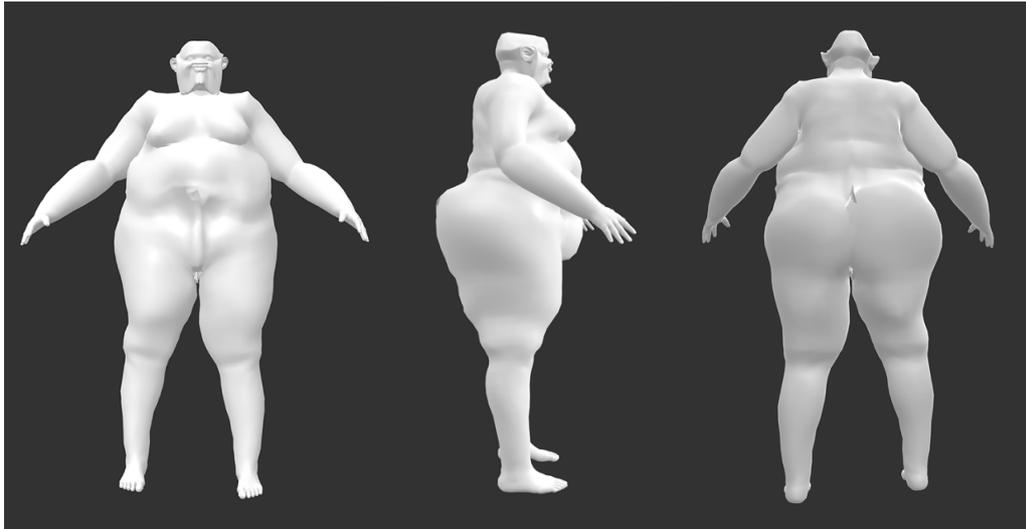


Figure 30: Front, right side, and back view of a figure

In terms of the tool's ability to represent physical characteristics uncommon in other platforms for modelling 3D human figures, the tool's representation and tendency toward size and fatness is notable. In Figure 30, the figure stands with arms apart and feet planted, viewed from the front, right side, and back. The figure has a large stomach, thighs, calves, feet, and buttocks, with relatively smaller arms and breasts. The head is small, rounded, and angular, and the stomach has a vertical textural disruption from the rounded pubic area to the navel, similar in appearance to a scar. The figure has visible rolls and accumulated areas of represented fat, particularly prominent in the thighs, hips, upper stomach, and middle back. In particular, the tool's tendency toward rolls and large stomachs is at odds with the paradigms of size representation in other standalone tools for modelling 3D human figures, in which fatness, insofar as it can be represented, is necessarily smooth and relatively small, in line with normative ideals about the body. In *Fearing the Black Body: The Racial Origins of Fat Phobia*, Strings (2019) discusses the so-called Enlightenment-era association of fatness with disease, moral inferiority and poverty, based on a connection of fatness to Blackness, attitudes which continue to inform social and medical biases about body size in the present through validation of intersecting racist, gendered, and classist bigotries about bodies. That characteristics of fatness are unrepresented or stereotyped in standalone programs for creating 3D human figures is therefore unsurprising, and that CreatorCustom's intentional propensity toward widening bodies, body parts, and characteristics like noses, lips, and faces represents a substantial departure from gendered and racially normative biases in other tools.

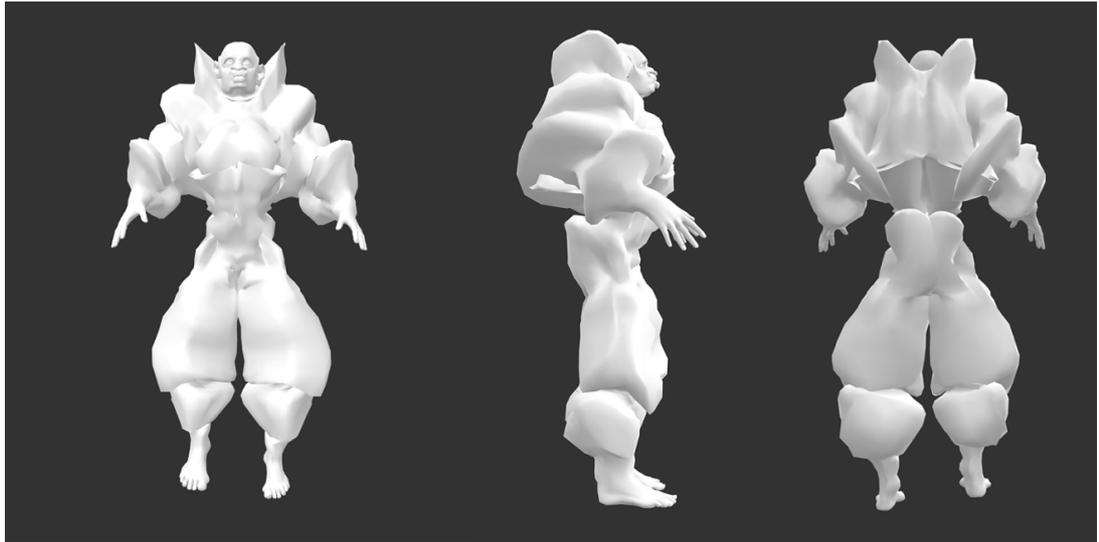


Figure 31: Front, right side, and back view of a figure

However, the capabilities and affordances of the tool for creating 3D human figures useful to my artistic work extend beyond the broadening of existing real-world characteristics. The capability of the tool to allow the user to manipulate characteristics of the figure body in an unlimited manner allowed me the chance to explore the exaggeration of these characteristics, into sculptural and creative forms in combination with recognisable human representation. In Figure 31, the figure's muscular structure is highlighted and enlarged so as to create an appearance similar to costuming or body armour. While the head, face, hands, and feet remain more or less realistic in appearance, with deep-set eyes, a wide nose, large lips, protruding ears, a square jaw, and large hands and feet visible, the remainder of the body is defined by muscles which billow outwards from the body. The stomach, thighs, and vulvic groin ripple with expanding muscle, while the legs appear encased in air-filled trousers, rounding outward above the knee and separately on the calves. The arms, likewise, expand, and the muscle forms near the shoulders take on a pointed appearance, into rounded points as though a protective shield ringing the head. The breasts make rounded, distinct and directional shapes, while the buttocks and back muscles expand upward into rounded and pointed shapes respectively. The back muscles appear nearly as wings, raised and separate from the back itself, symmetrical and otherworldly. Though the figure is stationary and these images are still, the figure has movement through the shape and positioning of the mesh, which appears to pull the figure upward and outward.



Figure 32: Front and left side view of a figure

Likewise, while Figure 32's upper torso, arms, legs and feet are smooth, relatively muscular and in line with normative and paradigmatic representations of human bodies in 3D modelling contexts, other characteristics further reveal the possibilities of the tool for enabling subtlety and surprising formal results. The fingers of each hand are lengthened and extended, with thin, spindly fingers extending downward, and the stomach is pulled outward, taut and to a point at the navel. The extension of the stomach creates a pronounced lip around the waist and buttocks from the side view, with a ridge extending from the hip toward the middle of the stomach, giving the pointed stomach a further geometric appearance. The genitalia is absent except for the penis, which has been compressed and widened so as to form a round, laterally ridged disc between the legs, which rounds slightly on the half pointing downward. The face, meanwhile, is extended from both the cheeks and the forehead, with the cheeks pulled down toward the shoulders in each direction. The forehead, meanwhile, points symmetrically upward in two rounded points with a depression in the middle, mimicking the cheek's downward movement with the mouth and chin in between. From the side view, the figure's head is dented inward in the middle, as though squeezed. Indeed, while at first glance, other aspects of the body certainly appear normative, the longer one looks, the clearer the lateral asymmetries become, including the difference in the size and positioning of the breasts, with the left breast significantly larger and lower than the right, or the biceps of the figure, where the left is significantly longer and the right is shorter and rounder, breaking the exact lateral symmetry common in 3D modelled human figures.

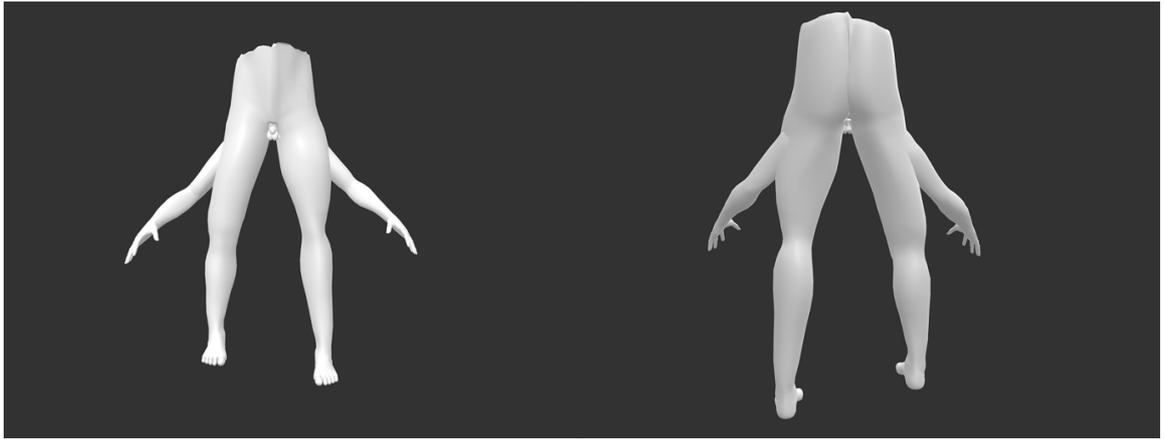


Figure 33: Front and back views of a 3D human figure made using CreatorCustom

While smoothness of the mesh material of the figure body is a common attribute of 3D modelled human figures, smooth does not necessarily mean that the figure takes a normative form. The figure depicted in Figure 33 has a pair of smooth and relatively symmetrical legs and buttocks, though the left leg is longer than the right, and the left buttock is slightly larger than the right. The figure has a penis and testicles, which, though visible, are proportionally small and ringed as though protruding from an orifice. The torso stops at the navel, with the circumference of the stomach defined by a ragged edge, as though cut roughly from paper or metal, slightly higher on the left side than the right. The figure's arms extend outward from the upper thighs in the extended pose common in this tool and other 3D modelling tools, with the palms open and pointed downward and the upper and lower arms raised outward and away from the body in either direction. The placement of the arms causes the viewer to read the lower torso as taking on a head-like appearance, with the genitalia appearing as a surrogate mouth or beak, a bird-like appearance heightened by the extension of the hands and arms similar to wings. The overall effect is one of a flying creature caught mid-flap, added to by the asymmetry of the legs and feet, which in this instance appear to float under their own power, a moth-like being made of human elements, or rather, a human being transformed.

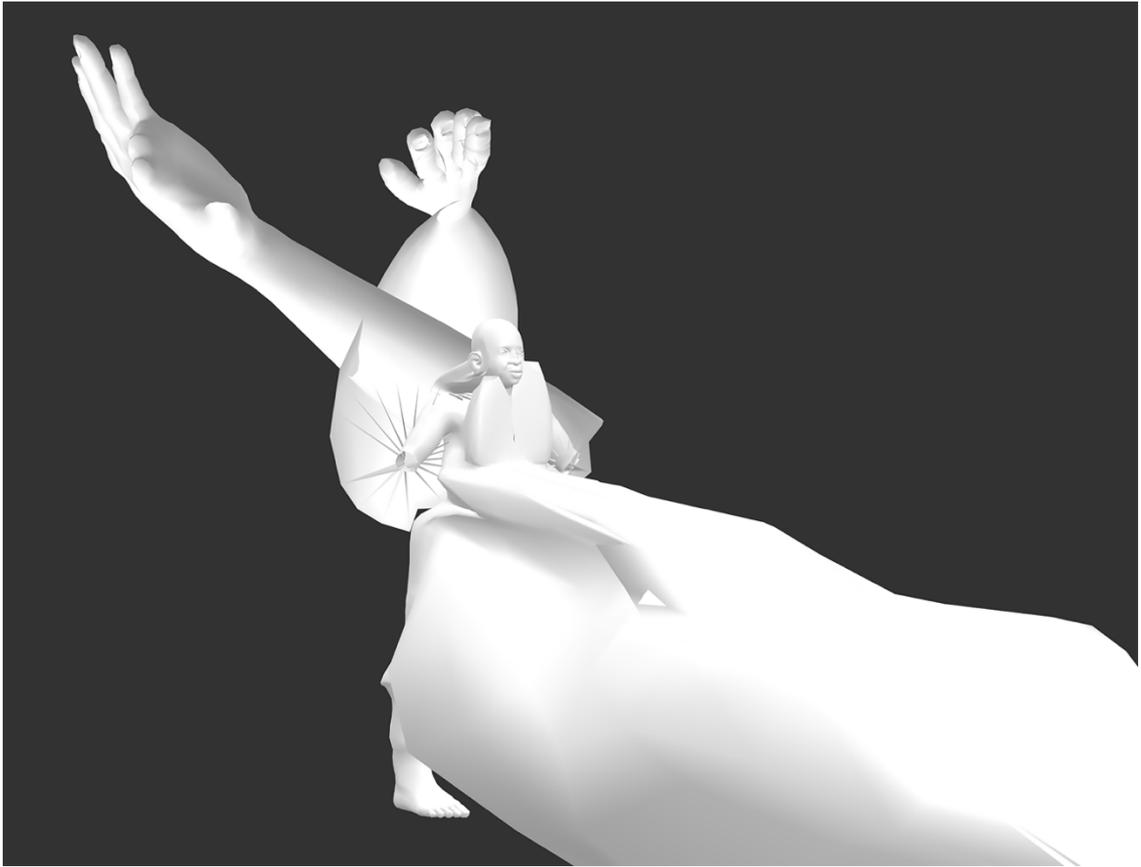


Figure 34: A large three-quarter view from the right side of a figure

The disruption of the coherent form of the figure body can also be pushed further, so as to integrate the figure but allow aspects of the figure to take on fully structural qualities asynchronous with the common representation of a figure with separate and distinct body parts. In Figure 34, the figure is broken up into a series of interconnected forms, providing a digital, spatially expansive composition of elements. The figure's head, shoulders, and upper torso are visible in the centre of the composition in the image, with a smooth, round, unbroken head, large jaw, lips, and nose, and visible though noticeably blocky legs and feet. The stomach, meanwhile, extends outward in a large, amorphous, organic shape several times larger than the coherent figure body, connected by a thin band to the figure's torso, as though flowing forward from it. The figure's lower arms and hands are inverted and crossed behind the figure's torso and head, each about twice the length of the figure body from head to foot, with the fingers of each hand variable in length. The inversion of the arms created a circle of spiked shapes around the floating upper arms, similar to a halo in Christian iconography. The breasts are flattened and move upwards, two oval, lung-like shapes ending on either side of the figure's chin. This figure has recognisably human elements, but would not likely be read by the viewer as being made up only of the elements of a human body. The degree of conversion of the figure body is such that its form becomes ambiguous and abstracted, both a human body and simultaneously far more.

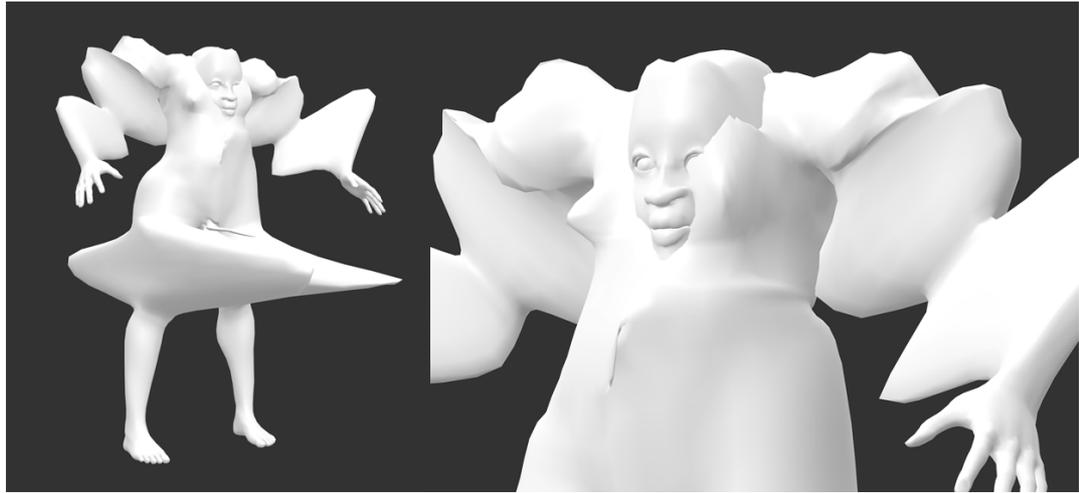


Figure 35: A figure body viewed in frontal three-quarter view from the right side (left) and close up in frontal three-quarter view from the left side (right)

Finally, Figure 35 brings together the representational and expressive body, because while the body remains discernible, it is not coherently representative of a normative human. The figure has wide, rounded hips, thin calves and small feet, short fingers and small hands. The figure's arms and shoulders, meanwhile, expand outward in segmented forms, creating a zigzag structure connecting the hands to the torso. The figure's upper thighs are likewise lengthened in terms of their depth, drawn out to points in forward and backward directions on the front and back of the body, though the front-facing point on the left thigh is most acute and pronounced. The genitalia is likewise drawn out, creating several long, rounded spikes in parallel between the figure's legs. The figure's stomach is firm, with the middle rounded very slightly outward; the navel, however, is drawn into a thin, vertical line. The figure's head has been drawn down into its chest cavity, resting slightly to the left of centre between the figure's breasts, with the lips visible at the bottom of the breast area and the top of the head domed slightly above where the top of the chest ends. The right breast is compressed and drawn to an angular, triangle-shaped nipple to the right side of the chest, while the left breast, which has been drawn up to cover the figure's left eye, is rounded and larger. The figure's mouth is upturned as though smiling, with the right eye wide open and a wide, flat nose. The figure is recognisable but detailed in its differences to a normative form, inviting the viewer to visually explore the amplifications of the body and their associations with it, considering its unique hybridity and the limits and limitations of humanness in representation.

My previous work which utilised 3D human figures used those figures to express thematic and conceptual ideas, to engage the viewer in considering their own body and experiences, and to expand ideas about the form and function a body might fulfil. The representation of the body in the works I created during this period were heavily influenced by the aesthetics of video games and commercial animation (which I explored intentionally as related to my own representation in previous works, as

described in Chapter 1), as well as contemporary 3D artists like Kytten Janae,³⁰ whose hyper realistic and psychedelic representations of the digital body as avatar informed my early engagement with the possibilities of the medium. The modifications made possible by my use of CreatorCustom are uniquely possible in digital 3D modelling using a system which allows the user theoretically limitless modifications of a human figure within those basic formal bounds, harnessing the materiality and material specificity of mesh-based modelling to produce quick and functional sketches of figures which push back against the normative human form. Eschewing some of the aesthetics common to digital 3D modelling and animation, this approach to the body is now perhaps more formally similar to that of artist Rachel Kneebone,³¹ whose delicate and highly detailed porcelain sculptures meld recognisable body parts and textured organic shapes into singular, abstract, highly-detailed forms, or to queer digital artist Gabriel Massan's³² 3D modelled avatars in drag, which take amorphous, highly textured, brightly coloured and only vaguely humanoid forms. Rather than using motion alone in order to indicate the porous experiential boundaries of the body as ongoing assemblage of relation and desire, the tool allows me to explore how the form of the figure itself might be extended to address those concepts.

The bodies created by CreatorCustom challenge normative ideas about the form a body might take, inviting the artist, and later, the viewer, to consider the role of the body in their work and what that body represents, communicates, and expresses. Instead of creating a vessel for the viewer to project their experience within the particular conceptual scope of an artistic work, the figures are necessarily co-constructed, a conversation about what a body is and can be, what a body can say or mean through its formal elements. They are, in a sense, yet cyborg bodies, produced through a collaborative effort of software and artist, blending both, "...a way out of the maze of dualisms in which we have explained our bodies and our tools to ourselves." (Haraway 1991, 181) Though this aspect is important to me as an artist, effecting a significant change in my relationship to the tools which enable and make up my practice, the figures are relevant beyond the method of their production, approaching the digital figure with experiential, rather than anatomical, accuracy. No longer strictly bound by the gendered categorisation which regulate humanness through the clearly and oppositionally sexed body (Butler 1993), the bodies I am able to create using the tool are something closer to Wittig's 'lesbian body', unbound from anatomical certainty or authority, relational and relative, occupying multiple states at once, at once interior and exterior, disarray, destruction, and desire. "Suddenly at one side of the avenues I perceive trickles of your blood. It flows making a small noise, I recognize it, its colour leaps to m/y eyes, there is no other like it. Exactly parallel in a gentle wave flows the white of your eyes. I can no longer stand up-right." (Wittig 1975, 52)

³⁰ <https://kytten.persona.co/>

³¹ https://whitecube.com/artists/artist/rachel_kneebone

³² <https://www.instagram.com/gabrielmassan>

6.7 Conclusion

This chapter addresses both my experience of using the tool which I created, CreatorCustom, in my practice as an artist, and the formal changes in my approach to the body as effected by my use of the tool. The form which my use of 3D human figures in my artistic work has taken during the course of this research project, from aquatic cyborg lesbian body hacking utopian figures, to allegories for the universal viewer's body, and, ultimately, as penetrable and vulnerable in its tenuous coherence, are presented to contextualise my experience of using the tool and its role in my work. My approach to recording my use of the tool, through screen recordings and a diary documenting my use and experience of using the tool after each session spent with it are then clarified, as is my engagement with the analysis of the data collected in this manner. The data itself reveal a sense of relief when using the tool, partially informed by my ability to use the tool to sketch and explore new ideas in a playful, low-stakes way dissimilar to using general 3D modelling tools. While I experienced difficulty separating myself in the writing of the diary text from my technical role in developing the tool, the forms the tool suggested offered significant inspiration, from which I was able to extrapolate, identify, and advance my own initial conceptual ideas. In discussing these points, I address my relationship to gender and technology, the influence of affect on my experience as a user of tools for creating 3D human figures, and the tool's specific propensity for suggestion and co-creation. I finish by presenting a selection of figures created using the tool, described in terms of their formal attributes and how those attributes propel my work toward a representation of the body beyond normative certainty.

CHAPTER VII CONCLUSION

At the commencement of this research project, I set out with the intention to create a tool for novice users of 3D modelling tools, which would allow such users to quickly and easily design mesh-based 3D human figures for use in artistic and creative work, without normative limitations to the forms of those figure bodies. During the period of my research, however, it became clearer to me that existing tools for creating 3D human figures might be said to support particularly inexperienced users by simplifying the form that 3D human figure can take, thus preventing users from making ‘mistakes’ when representing the body digitally, and making that particular paradigm for human representation synonymous with normative constraints. Rather than focusing on the provision of a tool which could provide a singular ‘good’ outcome, regardless of the user’s skillset, this research instead came to focus on providing a tool which prioritises serendipitous exploration of the forms a human figure might take in digital 3D modelling. Such a tool may be used by artists and creative users at various levels of experience, but it is perhaps most likely to be useful for those with an interest in 3D modelling, creating, and generating surprising bodily forms. My own desire to disrupt my representation of the body, to get out of previous patterns and to explore use of the body’s form, rather than a lack of 3D skill, drove the development of this tool on a personal artistic level.

In order to address the development of such a tool, this document begins by explaining the rationale for the project, introducing how it came about and summarising the approach discussed in the dissertation. The literature review details relevant theoretical and research background to issues contributing to the thesis, ranging from the role of the body in social context, to a review of currently available tools, their capabilities and limitations, and previously conducted studies addressing usability and user experience, direct manipulation interaction design, creativity support tools, and serendipity studies. From there, I conducted interviews with six queer working artists, to gather data about their choices, practices, and the materials they use, as well as the various representational, experiential, and practical roles of the body in their work, and the words they use to describe the actions they take in practice. These interviews revealed commonalities between the artists’ practices in the importance of exploratory work at the inception of an idea or project and allowing for surprises in certain aspects of their practice, the manner in which they made choices about the materials they used, and the

relationship between visual, representational, and sensory experiences of the body in artists when creating artistic work, as well as instances of mutual repetition across media in the language used to describe their actions and interactions with materials.

While these insights into visual art practice are valuable on their own terms and address a gap in the existing research literature, in the context of this research project, I applied them to the design and development of a direct manipulation tool for creating 3D human figures, focusing on developing a tool which addressed and facilitated the creation of a maximum array of possible bodies, with characteristics both 'realistic' and abstract. Users are able to manipulate individual characteristics of the figure body in an unlimited way, owing to an interaction design paradigm in which the user directly manipulates active areas of the figure body in order to achieve modifications to the figure's form. User testing of the prototyped tool was conducted in small group workshops with a total of 13 artist participants from a variety of material and demographic backgrounds, and revealed both flaws in the prototype's responsiveness and the coherence of certain functions, and promising areas for further inquiry and development in the tool's ability to provide serendipitous results for certain users, and to support the exploration and suggestion of ideas for artists creating 3D human figures. Finally, a survey of the impact of using the tool on my own artistic work was conducted over a three-month period, suggesting that the tool had a positive affective impact on my user experience, in context of my experiences using other available tools for making 3D human figures in order to create artistic work, and that the tool allowed me to explore the body formally and creatively in a way which resulted in unique and significantly different results to those I was able to conceive of and achieve previously. In this chapter, I will summarise the contributions ultimately put forth by this research, and opportunities for future work which might be undertaken in order to advance concepts further.

7.1 Summary of Findings

7.1.1 Materials and Materiality

As the participants in the artist interview series described, artists weigh a number of different considerations when determining which materials and methods to use, and how to use them. While further research is needed into the ways in which a wider variety of artists make choices in their practice, the Chapter 3 interviewees' responses suggest that formal qualities of a material, how easy or difficult that material is to work with for a particular artist, the material's relative availability and cost, and a variety of other factors impact the artist's choice to use a particular material or process in their practice, as well as the role that that material or process plays in their practice when it is used. A material which

requires a high degree of planning, precision, and attention in its use, or which is difficult or expensive to access, for example, is less likely to be used in the process of developing or evolving an idea or concept, and much more likely to be used with forethought to execute an existing idea. Conversely, some materials, because of their ease of use or low barrier of entry, availability, low cost, and the degree to which they facilitate iteration and surprising or unique results, are especially suited to use and incorporation early in the creative process, to work through the artist's ideas and to derive potential inspiration from. Materials which provide particularly interesting or surprising results with low stakes interaction on the artist's part may also be used to automate or leave up to chance aspects of the artist's process which they do not find pleasurable or interesting to attend to in a more time-consuming or labour-intensive fashion.

General digital 3D modelling tools, then, can be said to have a distinct materiality, using a web of interconnected vertices, lines, and faces to form a series of shell-like, primarily hollow forms, which can be weighted and rigged to move and mimic properties of physical objects or other bespoke desired effects. The material is characterised by a complex, specific knowledge base resulting in a high barrier to entry, requiring intricate technical precision, and often necessitating the understanding of other similarly complicated tools in order to make use of the objects produced or rendered by the general tool (many of these software tools are also relatively expensive to install, though there are open source options available). Pre-made assets, and to a greater extent, standalone tools for easy modelling, whether generally or of specific objects or sets of objects, can disrupt many of these factors for artists interacting with digital mesh-based 3D materiality, potentially facilitating an introduction to a complex material which allows the user to build skills they can then apply in general environments or when creating their own assets from scratch, or allowing the user to meet their own needs such that they are able to bypass specialist use of these environments. Tools specifically for modelling 3D human figures provide a simplified method for engaging with this material in order to create particularly complicated, highly detailed human figures, but in practice, the ease of use of these tools in facilitating user engagement with this material is typically bound up in the restriction of what the user is able to represent, along body-normative lines.

Though participants in the user study appeared to appreciate, understand, and even, at times, be excited by the use of common language among a variety of creative practices to distinguish the capabilities of the tools available in the software's user interface, it was also clear that they struggled to reconcile differences in the material response between the results they achieve and associate with those verbs in other materials, and the results they achieved using those tools in CreatorCustom. 'Carve' was difficult for some participants to understand because they associated carving with a subtractive sculpting process, which 3D modelling, and specifically, the style of 3D modelling used in the tool, does not afford, relying instead on deformation of the material to indicate a similar result. Similarly, the use of two verbs as a spectrum of possible action with a particular tool, depending upon the direction in which

the use engages with the tool in relation to the figure body, appeared to be more successful for verbs with pre-existing digital context, such as 'push' and 'pull', than tools for which the participant struggled to relate the verb labelling the tool to the material they were working with during the workshop. Additionally, since the results of the tool were unlimited but mediated through the characteristics of a body, rather than allowing the user to freely sculpt on the body, some participants found it difficult to differentiate between the outcome of certain tools. These results, while preliminary and requiring further inquiry (see section 7.2), indicate a generally positive response to the introduction of language and tool functionality specifically drawn from creative practice for modelling 3D human figures, but suggest that the introduction of such language is most likely to be successful when it is directly relevant or able to be contextualised in terms of the material qualities of the digital material they are using, rather than simply because the language and associated actions are familiar to them.

7.1.2 Roles and Uses of Digital Tools

The roles and uses of tools, particularly software tools for creative applications, are central to this dissertation. Some of the artists who participated in the workshop study (Chapter 5) expressed frustration with their inability to produce the results that they expected, on both a technical and representational level, when interacting with the tool, and felt that the tool's propensity for producing surprising results was an obvious design mistake or inherent drawback of the tool's functionality, interaction design, and representation of the figure body and its characteristics. While certain aspects of the design of this study may have exacerbated this response from participants, it is also arguably at odds with the phenomenon reported by many of the artist participants in the individual interviews (Chapter 3), in which they described choosing to use certain materials or tools because they offered surprising or inspiring results, particularly with relatively low time or effort investment in the scheme of those artist's overall practices. Conversely, software usability directives, even for creative tools, tend to support system outcomes which are consistent and reversible, leading to the faithful exploration and recording of existing ideas and allowing the user a high degree of control over the results they achieve. Though a balance of surprise and control is certainly important to achieve in creating a tool which offers especially relevant and useful suggestions to the users, it is worth considering how the tendency of usability evaluations and heuristics might tend toward characteristics which support more clearly defined stages of creative practice, while giving less weight to exploration and suggestion.

The workshop study provided initial evidence to suggest that CreatorCustom offers an experience of modelling 3D human figures which is unique in the sense of its ability to provide serendipitous and surprising results, though these results provided greater success and relevance for some participants than others. Chapter 5's P01 described their experience of using existing general tools for modelling in 3D as an overwhelming experience of having too many options, such that they were less able to feel

like a competent user of those tools, which they likened to having too many pens, markers, and pencils available when drawing as a child. In this context, they compared the tool favourably to a black pencil, implicitly with a low number of available input variables and a low barrier of entry, causing the user to focus less on the tool and more on exploration of potential ideas, a phenomenon that I also experienced when engaging with the tool as a user. The slight delay in the tool's response to user interaction, and, for some users, the form the figure took, disrupted this process for some, but not for others. While more specific research into why these issues carried more weight in the experience of using the tool for some users than others would be needed to provide a concrete assessment of user preferences in this sense, from the data collected in the user study, it is notable that two of the participants who praised the tool during the group interview and scored it highly on the Creativity Support Index were also the only two artist participants who reported using general 3D modelling tools regularly in their practice. This may indicate preliminarily that the tool is providing an experience and an environment which allows for the kind of stable, low stakes engagement described as beneficial by the artists interviewed in Chapter 3, in a material and representational context where such engagement is scarce, even for relatively experienced users.

7.1.3 Modelling the Body: A New Form

The treatment of the body in tools for modelling 3D human figures, both representationally in terms of the range of characteristics available, and in terms of the systems treatment and labelling of those characteristics, provided the original motivation toward the development of this research. While the ability of the tool to suggest surprising and novel results to the user is evaluated in terms of creativity support and serendipity, it is also important that the tool advance and complicate the kind of human figure bodies that the user is able to produce when using the tool. Many similar tools tend toward especially stereotypical representations of the figure's gendered, racial, and size-based characteristics, and foreclose on the possibility of representing characteristics of a range of physical disabilities at all, resulting in the production of a narrow range of normative possible figures using these tools. These factors were addressed in the development of the software tool through the removal of range limitations on the modifications that users are able to make to the figure body, editing of the target files associated with certain characteristics, and the introduction of a randomiser, which tends toward characteristics not normally represented in other systems, as the mechanism for outputting the figure with which the user interacts (Chapter 4). However, whether the user might recognise these differences, generally or relative to their experiences using other similar systems for modelling 3D human figures, and, if so, how they might perceive the purpose and the capabilities of the tool in this sense, technically and creatively, remained relevant to the inquiry of this research.

The user study suggests that the tool can successfully challenge certain ideas users may have about the body, but that such challenges and the expansion of the options available to the user may be most likely to be successful and easily incorporated if the user has a pre-existing context within which to understand these results. As P09 described in Chapter 5, for certain participants, interacting with the tool caused a re-evaluation or realisation of the characteristics they associated with ‘humanness’ in digital environments and tools, which they specifically described associating with their own experiences of their body as a trans person. For other participants, who were not able to contextualise the form of the figure presented to them in the tool, the figure body appeared non-human or not suitably human, while those who had some context for the figure’s representation, whether through an association with their own experiences, a practice of or desire for abstraction or extra-human representation in their own artistic work, or a combination of these factors, were more able to be surprised and moved by the results the tool offered. This relates clearly to my experience of relief when using the tool in my own practice, and to the affective usability challenges I experienced when using other tools to model 3D human figures during the course of my artistic practice. Usability is to some degree determined by the user’s desired output and the tool’s ability to produce this output in a suitable manner, but is also determined by the experience of input and interaction with the tool, and the inherent biases that the tool reflects, especially when a tool deals with human bodies, their representation, and their categorisation.

As the artists interviewed in Chapter 3 described, the role that the body takes on in artwork and creative practice is many-layered, practice-specific, and contextual. The body may facilitate the practitioner’s interaction with their materials in a specific or skilled way, represent or communicate a concept or idea in the artwork itself, be experienced by a performer as they perform and be viewed from the outside as a performer by spectators, among other possible scenarios. The form of the body, as represented in CreatorCustom, specifies and abstracts the body, taking it from a coherent, wholly separate vehicle for human consciousness and into an experiential, assembled form, visualising a co-created consciousness. Indeed, the figure bodies which I was able to create when using the tool allowed me to explore the body as a formal, sculptural object, and to consider how these forms could communicate spatial motion, feeling, and bodily experience to a viewer engaging with them. The incorporation of the figures I produced while using the tool, in combination with my broader conceptual aims, brought about a new representational direction in my artistic practice, and allowed me to explore modes of representation which were difficult to visualise or approach realising in 3D modelling without having seen similar work prior. Though visually and formally disparate and ambiguous human forms have a strong lineage in contemporary and art historical contexts, the use of the specific characteristics of 3D mesh-based digital materiality, including easy inversion and infinite scaling of areas of the body, to facilitate the realisation of such forms in 3D modelling, advanced the conceptual representation of the body in my artwork significantly.

7.2 Future Work

In terms of future work which might be conducted specifically with respect to the prototype of CreatorCustom described in this research, immediate work might be done in order to mitigate the delay in response present in the tool, and to implement some of the workshop study participants' suggestions detailed in Chapter 5, particularly those related to delineating active tools, allowing for additional views of the figure body, and clarifying and evolving the language and specificity of function of the tools available to the user. While some optimisation work can be done to improve the responsiveness of the tool during modelling, there may also be an opportunity for further work in this field related to producing systems for simplified modelling of 3D objects and the methods available to facilitate these forms of interaction. Specifically, the use of targets and proxy meshes to 'stand in' for the highly detailed figure body mesh allows for a system which is able to create complex modifications without the platform instability associated with modelling at a high level of detail in general software tools, but prevents the user from interacting directly with the mesh structure in order to make detailed modifications outside of the format of those specified by the target files. More work is needed in order to create a method for 3D modelling which meaningfully bridges the gap between these two approaches, while preserving the stability of the modelling environment. This may also be addressed through the development of new material forms for digital 3D modelling, a few ideas for which were suggested by participants, such as those which would allow for subtractive sculpting or for a body modelled in anatomical layers, among other ideas. Given the interactive differences of any potential new material for digital 3D modelling, relevant and appropriate methods for facilitating engaging and satisfying user experience in those tools would also require further inquiry.

As the artist interviews described in Chapter 3 documented, art practice in a variety of media and with different practitioners is ripe for exploration, beyond the boundaries of its literal application to the development of software and hardware tools. Some factors relevant to the creation of artistic work may indeed arise from phenomena which are difficult to quantify and study according to scientific means, but artists' choices, practices, and processes are concrete, and practitioners are often able to discuss familiar and relevant processes in illuminating detail. Studying and understanding the practices of creative and conceptual artists may have implications not only for the design of tools and processes we might use, but also for pedagogy, support, and nuanced understanding of art practice, and the motivations, priorities, and desires of art workers. Likewise, more research might be conducted into the ability of tools for modelling and incorporating human figures and forms for disrupting normative ideas and processes among users or particular groups of users in creative contexts, perhaps those who work primarily in 3D modelling, or who work with the body in more specific representational contexts in their creative work, among others. Other related aspects of the process of digital 3D modelling in terms of human figures might also be considered, scrutinised, and redesigned in terms of their implicitly

normative qualities; for example, most skeleton rigs available for 3D human figures assume four limbs and an otherwise normative body structure, and the lighting systems used in general 3D modelling tools and specific standalone tools might be examined further in terms of how these systems respond to material which mimics darker skin tones.³³ Finally, the expansion of tools for modelling 3D human figures might be considered to include other forms of abstraction and representation, and to further question and examine the representation of the human form and its consequences in digital and artistic settings.

7.3 Conclusion

This chapter summarises the findings of this research documented in this dissertation, and suggests briefly a variety of directions in which future related research and study might be conducted, whether by myself or other researchers in similar fields. The findings of this research primarily address materials and materiality, the roles of digital tools, and the modelling of 3D human figure bodies in the context of art practice, user experience, and software design. That software tools can provide serendipitous results, and that artists may select materials, tools, and methods specifically because they produce interesting, surprising, and inspiring results with little effort or time investment, was confirmed by the artists interview participants; the ability of CreatorCustom to suggest such results to the participants in the user study when modelling 3D human figures appeared specifically to depend on the users' ability to contextualise and make meaning from those results, whether in terms of their own practice or personal experiences. The tool was developed with the intention of disrupting the normative representation of 3D human figures in digital space, and this, likewise, appeared to be more successful for users who had some prior context for abstract, sculptural, and experiential human bodies and their representation. While more research is needed into a variety of fields related to the topics discussed here in order to build on these initial findings, the tool's effect on the figures which I am able to create for use in my own practice has been marked. Developing and using CreatorCustom in my own artistic practice has moved me toward a form of conceptual representation of the digital figure body which I was not able to imagine or advance in my prior artistic work.

³³ The technical conventions of film photography were tested according to their faithful representation of light skin tones as a baseline, a bias that has carried over into the technology of digital photography, video, and colour correction as well; similar issues have been reported with lighting of dark skin tones in video games (Y. Cole and DePass 2017; Yang 2018). For more information, see Lewis 2019.

APPENDIX A ARTIST PROFILES

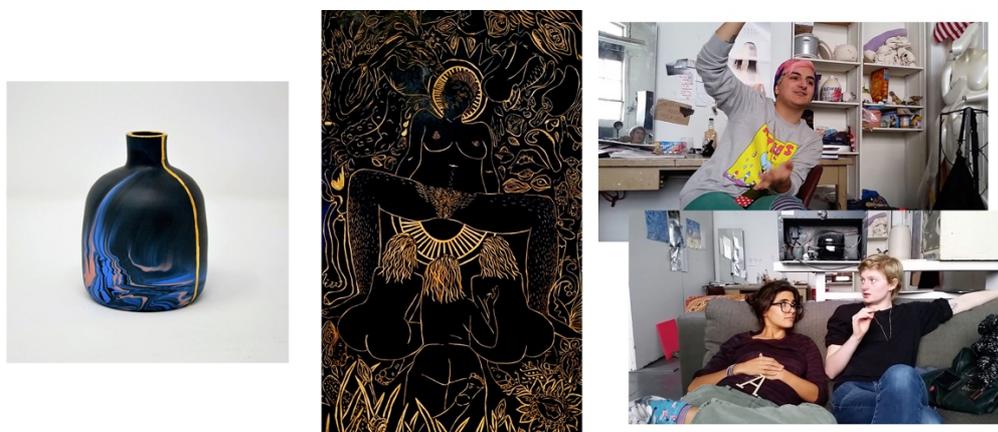


Video stills from the material manipulation sessions of the artist interviews



Video stills from the material manipulation session with Bernie Daroux

Bernie Daroux is a Brooklyn-based independent ceramicist and artist with experience in a variety of sculptural and two-dimensional media. While ceramic work has been and remains a constant in her practice over the course of her artistic life, she has worked with wood, printmaking, fibres (including embroidery and crochet), performance, video, and found objects in the past. Her work has focused heavily on political themes related to body image, queer sexuality and identity-making, and community, with visual themes including nudes, queer sex, vulvas hidden in plain sight, and self-portraits. Her BFA thesis from Pratt Institute, titled *Shooting the Queer Shit (So tell me about eating pussy)* (2015), is a video of recorded interviews with Daroux's LGBT+ friends with whom she has not had sex, discussing their sex lives, the things they have taught her about having queer and lesbian sex, and other feelings and inter-community issues. In her current practice, she creates marbled, multi-coloured, gold-accented dishes, vessels, smoking paraphernalia, and ceramic jewellery for primarily commercial purposes. Her process involves both hand-building and throwing on the wheel, with many of her thrown vessels becoming moulds to create multiples of the same shape in various colour schemes of swirling pattern. See <https://www.goldbearstudio.com/> for more information.



Left: ceramic work (2018), Centre: *Untitled* (woodcut, 2014), Right: *Shooting the Queer Shit* (video, 2015)

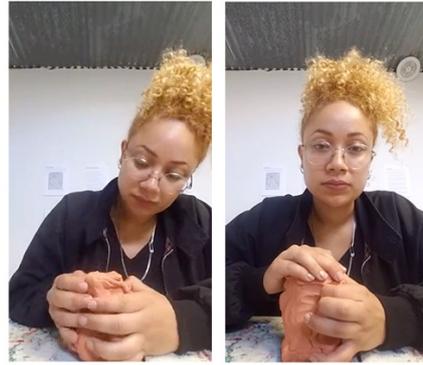


Video stills from the material manipulation session with Clyo

Clyo is a queer femme performer and rope bondage practitioner of colour living in Berlin, Germany. They describe their practice in rope as having the possibility to be, "... about tying someone up, it can be about getting tied up, or tying oneself up". They prefer to use jute ropes in her practice, and states that though they practice suspension and self-suspension using ropes, floor work is equally "bondage" and a part of their practice. They also make a distinction between the role of rope bondage as a BDSM practice and its significance for them as a creative, performance-based practice; while they also play in BDSM spaces, their creative rope practice is not synonymous with sexual or BDSM-centred play for them, though those practices may intersect at times. Their first solo self-suspension performance took place at the October 2017 Berlin Porn Film Festival. They had been practicing for two years at the time of their interview in April 2017, and they currently teach workshops and participate in skill-shares with other practitioners in bondage spaces. See <https://www.instagram.com/the.clyo/> for more information.



The artist self-tying (2017)



Video stills from the material manipulation session with GeoVanna Gonzalez (via Skype)

GeoVanna Gonzalez is a Miami/Berlin-based artist and curator. Her work seeks to connect private and public space through interventionist, participatory art with an emphasis on collaboration and collectivity. She builds installations that are designed for non-directive play in order to express the potential of our embodied cognition. She uses synthetic or partially man-made materials that she has created herself (for example, plastic she has moulded) or manipulated (in one instance, painting a manufactured plastic potted plant to look as realistic as possible) to create the appearance of natural objects, scenes, or situations, influencing the viewer's perception of the objects used in her work. Through her work she addresses the shifting notions of gender and identity, intimacy and proximity, and forms of communication and miscommunication in today's technological and consumer culture. These improvisations are political acts, analysing and critiquing what it means to share public space as womxn, queer folks and people of colour. GeoVanna was born and raised in Los Angeles, California, USA, where she received her BFA at Otis College of Art and Design. See <https://geo-vanna.com/> for more information.



Left: *I Think We're Moving Too Fast* (video installation 2016), Right: *You Smell Like a Designer* (resin, hydro dipping film, & acrylic glass, 2016)



Video stills from the material manipulation session with hari_klia

hari_klia is a queer visual and performance artist and art student in Berlin, Germany. Her work concerns themes of gender, ambiguity and subversion, sexuality, relationships, and the passage of time. Her visual artistic work includes work in concrete, plaster, video, installation, photography, and tattooing, while her performance work uses found and created objects, morph suits, paint, and her own body to communicate these concepts. In her performative installation *Scham* (EN: Shame, 2016), she used her physical presence and action juxtaposed with childhood images and other art objects to discuss her experiences of confusion, bullying, and humiliation surrounding gender as a child. Other projects have included cast concrete and plaster sex toys (*Der Phall*, *Der Phall II*, 2017), *leben und sterben* (EN: life and death, 2016), a recorded performance involving the use and experience of her body to communicate the procession of life toward death, and *Hybrid* (2016), a photo series in which she takes another person's body hair and attaches it to her own body. See <https://hari-klia.com/> for more information.



Left: *leben und sterben* (performance documentation, 2016), Right: Photo from *Eat Pussy* (2016)



Video stills from the interview and material manipulation session

Sadie Lune is a visual and performance artist and writer who works in a wide variety of media, from film to fabric sculpture to printmaking to interactive physical performance. Her performance work is often durational, performed as part of a larger event, such as a party or art opening of installed works, using ritual to explore sexuality, intimacy, gender, and shame. One such example is Lune’s performance *Milk Bar* (2014), in which she filled shot glasses with her breast milk and passed them out to the crowd at a club night, while other work has involved intimacy through imitated life coaching with participants, rituals performed to a small audience in gallery spaces, and her legendary cervix-gazing sessions. Her visual artwork includes painting, linoleum-cut printmaking, photography, and film, as well as found and/or fabric-based sculpture. Her visual art focuses on portraiture and depicting human bodies, real, imagined, or exaggerated. Lune has undertaken a variety of artistic training at high school and undergraduate levels, and has “exhibited explicit whore-positive work in squats and the SFMOMA, and shown her cervix internationally”, as she describes on her website. She is also an award-winning director, queer porn performer, workshop facilitator, and parent. See <https://www.sadielune.com/> for more information.



Left and Centre: *Entanglement* (performance, 2015), Right: *Snake Mama* (linocut, 2011)



Video stills from the interview and material manipulation session with Soofiya

Soofiya is a graphic designer, illustrator, and visual artist working in a range of print and digital media on various commercial and personal projects. Soofiya's website describes their art practice as aiming “...to articulate a commentary on gender, race, politics and bodies through a DIY and therapeutically informed approach”, and their paid design work as oriented toward visual identity and illustration. Their work includes contributions to the *Sisters Uncut Colouring Book* (2016), editorial illustration for major magazines, showcases and collaborations with the Tate Modern and national and international institutions, and self-produced risograph zines, among them *Radical Softness* (2016), *Things I Love* (2017), and *How to be an Anarchist* (2017). Their current projects include a forthcoming Book of Anger, based loosely on medieval illuminated manuscripts, and an 80s/90s-themed Femme of Colour tarot deck. Soofiya holds a BA in Graphic Design and a MA in Book Design, and currently lecturer in graphic design, teaching students at pre-degree, undergraduate, and postgraduate level. See <https://www.soofiya.com/> for more information.



Left to Right: The World (Tarot Card), 'Nurturing Anger' from *The Book of Anger*, Temperance (Tarot Card)

APPENDIX B ARTIST INTERVIEWS

Interview with Bernie Daroux

28 August 2017, in her studio, Brooklyn, NY, USA

KHN: There it goes. Okay, are you ready?

BD: Yeah.

KHN: Cool. So if you can start by briefly describing your practice a little bit...

BD: Yeah.

KHN: ...in terms of like the kinds of material you use and like what you do.

BD: Okay. I use all sorts of different clay materials. I throw a lot of pottery, so that's like throwing clay and the wheel and different like little wooden tools and then I do slip casting which involves having a prototype, usually something that I throw on the wheel and then making a mould out of it so I use plaster and I've become very good at making moulds and it's part of my practice now. And so then for the slip casting I use a liquid clay and I use different colours. Yeah, and then I use gold lustre on my work and I'd say that's about it. Mostly clay things, different kinds of clay materials.

KHN: Yeah, and you've used other stuff in the past but...

BD: Oh yeah, I've done all sorts of other stuff but right now I'm really just doing clay because that's what I am, what I love.

KHN: Yeah.

BD: Yeah.

KHN: Cool.

BD: Yeah.

KHN: And can you yeah, yeah, no, you've described your practice pretty clearly.

BD: Okay.

KHN: So you answered that so well I...

BD: Oh okay. [Laughter].

KHN: You win, so thinking of kind of like the last finished work that you made, whenever that means for you.

BD: Yeah.

KHN: Do you usually conceive of the work you make as like a finished piece in your head before you make it or does it take more of an organic process?

BD: Well I love what I'm doing right now because I have to give up a certain amount of control. Some part of it is very controlled, like the prototypes have to be perfect. I have to control that 100%. The moulds have to be perfect. The slip has to be in very good condition and it needs to be the correct thickness. But then...

KHN: For it to even work right?

BD: Yeah, for it to work but then I give up all control when I'm actually making the pieces themselves, slip casting, and I really love that part because I feel like I really don't enjoy hand decorating stuff and the way I'm doing things now is it does it for me. The colours do their thing and then I get to see what it made which is great and then I get to do the finishing touches on the work but a lot is left up to chance for I guess the creative... What people would call the creative part of it, of the final piece is, I don't want to control it so...

KHN: Do you do things to influence like how the colours come out or...

BD: I do, I've learned how to get the best results but still every time it's a surprise.

KHN: Right.

BD: Which I really love because part of the reason I love ceramic so much is because you get to be a mad scientist and you're always trying new things and learning new things and like every day I make stuff, I learn about how the different slips interact and like different ways to lay the colour into the bucket of slip before I pour it and then I get this different combination that comes out in the piece. So, yes.

KHN: okay and in terms of like the shape of it, do you like...

BD: Oh there's giant rats.

KHN: Oh good.

BD: Hopefully that wasn't a giant rat, that was something else [laughter]. [Clapping]. It definitely sounds like a giant rat. We're just going to pretend, we're up here, we're okay.

KHN: It sounded like a rat, that's fine.

BD: Yeah.

KHN: So when you're thinking of like the shape you want to make, do you like think of that beforehand or do you just kind of go at it?

BD: Yeah, well, so that's the prototype making, that's really the first step...

KHN: Yeah.

BD: ...and I love throwing and I love being on the wheel. But now when I'm throwing, like sometimes I'll throw just like for fun, for myself, but I've lately been throwing with a very directed reason, like I need this mug to be perfect for this prototype because it's going to make like 300 mugs...

KHN: Yeah.

BD: ...for the season.

KHN: Yeah.

BD: What else was in that question?

KHN: Yeah, so like you go into that knowing like I need to make this thing?

BD: Yeah...

KHN: Purpose driven?

BD: Yeah, it's very purpose driven right now.

KHN: Hmm.

BD: And I think the nice thing about throwing is that you have an idea in mind but just the slightest change of the top of the piece, like if it goes in a little bit instead of going straight up or like the bottom, if you just change it a little bit, it makes it into a completely different thing and I really love playing with form so the wheel is really... It's a really great place to just like practice that, finding the perfect form. There really is no such thing as the perfect form but like really testing what looks good and what works and what doesn't because it's just the slightest difference that makes a piece go from 'Oh that's nice' to like 'Wow, that's a great shape'. It can just be the littlest change, which I love.

KHN: Yeah and I would think trying that out on the wheel is probably also good because like if you fuck up you can just...

BD: Yeah.

KHN: ...crush it back down.

BD: That's the best part, it's just like recycle, recycle, recycle...

KHN: Yeah.

BD: ...and start it over, do it over, do it over.

KHN: Hmm.

BD: Yeah.

KHN: Yeah.

BD: And the more, something I love about clay also is the more that you use a single ball of clay and you make a mug and you don't like it and you smush it back and you re-wedge it, the more you do that, the better quality the clay is. And if you could keep the same like 20 lbs of clay going for a whole year to practice with, it'll just be better and better quality, which is kind of cool. The throwing, there's memory in the clay and when you throw it you move the particles in a certain way and it like realigns them and the more you do that, the better you can throw with it which is really interesting.

KHN: Yeah.

BD: It's like sour dough or something.

KHN: Yeah.

BD: It just keeps going.

KHN: Okay. So when you're working with the materials themselves, right, with the clay, do you think of specific actions and steps that you need to take to achieve your goal or?

BD: Yes.

KHN: Okay, can you talk a little bit about that?

BD: Yeah. So I would say the first step is wedging your clay, that's before it even touches the wheel, you have to... It's like kneading dough. You knead your ball of clay until... You want to do it for at least three minutes because you want to make sure all the air is out. You want to make sure it's a good consistency and you're packing in the particles and making it like tight. So that's the first really important step and then you have to decide how much weight-wise you need for what you're going to make. So like a mug would be like anywhere from 1 lb to 2 lbs and then something bigger would be more and you just have to have an idea in your mind of how much you're going to need. And then getting it on the wheel, the first step and usually the hardest step is centring the clay and making sure that it feels like it's almost not moving while it's spinning really quickly on the wheel. And then you open up the clay which is, I'll show you, and then you can start making your form.

KHN: Yeah.

BD: And then after that there's little things that I always have to remember, to compress the bottom when I'm throwing it, and it's interesting, when I think about these steps I always think about this. I remember distinctly the different teachers that taught me to do the different steps or like even friends who taught me to do a trick or reminded me how to do something. And I still remember those people as I'm doing those steps, which I really love because I've had so many different teachers and

that's like an important part of I guess my ceramic practice is how many different people I've learned from and like collected things from so, yeah.

KHN: Awesome.

BD: So I remember people with steps, yeah.

KHN: Okay, so thinking about your practice in terms of like action and interaction with the clay, with the yeah, all the materials when you're casting, all of that, specifically about action though...

BD: Yeah.

KHN: ...can you think of five verbs or adjectives that describe the way you interact in your practice? So not like nouns, not like clay like...

BD: Yeah.

KHN: Yeah.

BD: Clean.

KHN: Yeah.

BD: That's number one. Timing.

KHN: Hmm.

BD: Clean, everything has to be super clean.

KHN: Hmm.

BD: I have to time everything, make sure I don't... Patience, I don't know if that...

KHN: Hmm, sort of. I'm talking more about like literal actions.

BD: Yeah, I guess, how would I say a literal action? Drying? There's so much waiting. I guess is waiting an action?

KHN: Yeah.

BD: And being mindful of waiting and not rushing it.

KHN: Hmm.

BD: I don't know how I would say that in like a noun or verb. Cleaning, so clean. Oh this is hard.

KHN: Yeah.

BD: What did I say? I said clean, what were the other ones?

KHN: You said cleaning, timing, patience, waiting.

BD: Slow. Like going slowly. Careful, I don't know to say like being super, super careful and not

rushing through things.

KHN: Hmm.

BD: I don't know what word that would be besides like patience.

KHN: Yeah.

BD: Yeah.

KHN: Hmm.

BD: Was that five?

KHN: And in terms of like when you're touching the clay?

BD: Touching the clay, gentle, being very gentle. Clean, gentle, light touches, I don't know, did I get five?

KHN: Yeah.

BD: Yeah, okay. It's also fragile, it's just like don't brush it on anything, don't set it in a stupid spot.

KHN: Hmm, hmm, yeah.

BD: Yeah.

KHN: Yeah, okay. So when you're working with clay and you make a modification to the thing that you're making, can you change or reverse that modification?

BD: With throwing, yes, because throwing is all about recycling.

KHN: Hmm.

BD: But with the final products, the like slip cast products, there's no reversing. There is also recycling but I guess it is the same process but it's a lot more complicated.

KHN: Yeah.

BD: Yeah. Yeah, but there's no going backwards on the same piece with clay. Or with what I do with clay. Yeah, something is alive over there.

KHN: Yeah I think I saw one. What do you feel like was the most important skill for you to learn when you were starting, like physical skill?

BD: Like ceramic skill?

KHN: Yeah.

BD: Most important skill, hmm, that's a good question. I don't know, most important skill. I want to say wedging, like really the first step...

KHN: Yeah.

BD: ...because if you have a bunch of bubbles in your clay, if you don't wedge it well enough, everything you make is going to be trash. So that is really the first and most important thing.

KHN: Yeah. Okay, cool. Alright, so I think...

KHN: Alright?

BD: Okay, so first step is wedging the clay, kneading the dough and what I've learned is put one leg forward and you can switch either side and my right side is pushing and my left side is controlling the way it moves. And I want to get a nice spiral going at the top and then I can switch. So then I'm pushing, whatever side is forward with my body is the pushing and the other hand is the making sure it stays in the right spot. It's hard, I usually do right hand doing the pushing but it's hard on my wrist so I've got to switch it up, it's good practice.

KHN: Yeah.

BD: And I'm just rolling, rolling, rolling. What I've learned is the most important part of this is using your whole body to push forward and not just like your arms and your wrists. That's a big part about ceramics and throwing, it's really like putting your whole body into it so you're not just hurting one part of yourself.

KHN: Yeah.

BD: Yeah. And it's much easier that way, it's a lot less work if your whole body does the pushing.

KHN: Hmm.

BD: Right, that's pretty good. Now we're going to divide it up into three balls.

KHN: Hmm. What are you doing to it right now?

BD: I'm just getting it into like a nice tubular shape so I can cut it into three sections. Okay, got my wire tool. One, two, then I like to start with something close to a ball so when I get to the wheel it's a lot easier. I want to try and get rid of those like super spirally areas.

KHN: Yeah, so what are you doing with your hands right now?

BD: So I'm slapping it into submission and trying to get it into a good shape for when I throw it on the wheel. Okay.

KHN: Nice.

BD: And when I mean throw, I'm literally going to throw this ball onto the centre. So just smacking you into an almost round shape. Smack, smack, smack, okay. Right, good enough. Okay now we go to the wheel. Okay, so I have my bat on my wheel so I can take this on and off when I'm ready. There, so that pops off when the piece is done. Okay. First step try and literally throw this onto the

centre because you want it to stick because the worst thing is you start pushing and it just flies off which can happen.

KHN: Right, yeah.

BD: Right, it's not the best, kind of scoot it in there, okay. Try and get it a little closer to a ball but you can't fuck with it too much once it's on there because you will get it out of centre, even though you think you're helping. Okay that looks pretty good. Put this in the right spot and I have my water for my right hand, on the right side. I have my sponge. Got all my little tools, my pedal. Okay. First step is getting, well not first step, I guess second step is getting it centred. It's not, whoa, whoa see, I didn't steer hard enough and it flew off. Alright. Next one. You always have multiple balls of clay ready for this situation exactly.

Okay. Clean your hands because if your hands are too wet it's going to be a mess. Just have to be semi-dry. Make sure your bat is clean again and a little dry. Right now throwing it back into the centre here, smacking it down, alright. Nice and stuck, okay. So now I'm using both hands, pretty much equally right now. And I'm just trying to force it together. I'd say when you're centring you're really trying to force the clay into itself and then I will be doing most of the pushing with my left hand actually because of the way the wheel spins, the direction it spins.

So coning up, and the way to centre, there's different ways, but the way I do it is you try and make the clay tall. You like make like a tall cone. It's very phallic but this is a good way to control it, to get it centred. And then you push it back down. I'm pushing with my left hand and I'm just controlling with my right hand. See and see it kind of loses its centre as it goes down.

KHN: Right.

BD: Okay. So now I'm going to push down with my left hand a little bit and my hands always have to be wet. That's the most important thing. Not the most important thing, but something that's very, very important. Your hands have to be wet so they're slick and they don't stick to the clay because that's when it becomes off-centre. Okay, we're going to cone it one more time. Up, I'm pushing with my left hand, holding with my right hand. Okay, pushing with my left, bottom of my thumb and then I'm pushing down with my left hand and I'm using my elbow and my knee to support my upper body, to support my arm so they don't flail around because like throwing with no control, you want to be grounded with your arms on your legs. That's very important. Whenever I help people throw, I'm like you have to, elbows on your knees, elbows on your knees, elbows on your knees because that's where you have all the control. Alright, we're pretty good here. Just using my left hand. Almost there, still a little off.

Okay, pretty good and now clean to make sure the less like gunk you have on your hands, the less slip, the cleaner they are and they are just wet with water the better and the cleaner your piece is going to be when it comes out. Okay, next step is opening the clay. So I'm going to stick two right fingers

straight down into the centre, slowly and I'm just pushing down and it slowly opens it. Keep my fingers damp, don't want them to stick. I'm going to about a half inch to the bottom, an inch to half inch, don't want to go too far down, and then got to compress your lip. It's something that's very important too and compressing your lip starts now and you're doing it through the whole piece. So then I'm pulling out with my right fingers, pulling out slowly, slowly, keeping them damp, slowly. I can feel it becoming more off-centred as I pull it out but that's what happens when you pull it out. Okay, so now I'm going to compress the bottom. Very important because if you don't compress the bottom with a sponge, you'll get little cracks in the bottom of your pot.

You want to really compress those particles. And you want to get as close as you can to a like right angle on the sides and now, so we were at full speed for the centring and the opening of the clay and now we're going to take it down to pretty slow and I'm going to take my foot off the pedal because I lose a lot of control if I'm worrying about that.

KHN: Hmm.

BD: So the slower the better really. I can't remember who taught me that. I think Keith taught me that. Okay, so now we're going to make a mug, so it's going to be kind of big but everyone loves big mugs so that's fine. So now I'm going to use the sponge in my right hand and I'm going to dampen it, get the whole thing nice and slick. I'm going to use my pointer and middle finger of my right hand to carefully push at the bottom, while my left pointer and middle finger are in the exact same spot on the inside, so they're supporting each other. And I'm slowly pushing and pulling up but most of the work is happening with my right hand. You put most of your pressure on the outside of your pots when you're throwing them. Okay. First pull, cleaning up the lip, compressing the lip, compress your lip. And I always want to periodically clean the extra water that's in the inside, that falls in the inside of the pot because it'll make the clay at the bottom really soft. Okay, and dampen it again with my sponge in my right hand and I'm going to use the sponge this time instead of my fingers on the outside and carefully press and pull up slowly, very slowly, okay.

So now, again, at the end of this pull I'm going to compress my lip with my sponge a little bit, with my fingers. Your sponge really becomes an extension of your fingers which is a great tool you use because it's a lot softer, it's like a softer surface area for the clay instead of your two pointy fingertips. Do another pull. This is going to be a tall mug so wet it with my sponge, use my sponge on the outside with my right hand and slowly pull up. I'm trying to make sure that the walls are even throughout the piece. Pretty good. Slowly compressing, okay, compress my lip, clean the water out of the inside. How are you looking? Checking the thickness. Okay, it's still pretty thick at the bottom. I'll do one more pull. Water, let's do sponge. Sponge, slowly pulling up. My right hand is doing all of the work. My left side is just supporting the pot. And up slowly and you can never stop a pull midway. You can once you're good enough and can like remember where you stopped but it's very important to finish your pulls most of the time because it leaves your pot uneven. Okay compress to clean the inside.

Okay, that's pretty nice, so now I'm going to get my red rib to clean up the outside and you almost always have your sponge in your hand. I do. So I'm going to dampen it and then I'm going to use my right hand. I still have my sponge and I'm going to really smooth out the surface with my rib and slowly pull it up and I'm always supporting with my left hand. Okay. Clean off the gunk. Okay, nice and straight, nice and even. Clean out the water from the inside, very important. Okay so now we're going to clean up the bottom of the pot. I'm going to use a wooden tool. It's pretty sharp on the end. You want to make sure you clean all the old clay off because you'll see that hard mark that's left, okay. So I'm going to use the rounded edge and take up a little bit of the bottom. And I'm doing the work with my right hand and the controlling with my left hand and then I'm going to use the sharp side with my right hand, clean up the bottom, and I'm using my left hand to support my right hand always. Okay, still a little more. I always do a bit of an undercut at the bottom because it helps the pots, it gives them like a visual lift. Pieces don't look as good when they're sitting like 90 degrees on the ground. It's good to give them a little bit of like a shadow, a little bit of a curve at the bottom.

KHN: Hmm.

BD: Okay, I'm going to go over with the red rib one more time. And this is also a nice way to control the shape. Supporting with my left hand. Actually we're going to make it a little rounded in the centre. So now I'm just going to use my left hand and I'm just going to carefully really lightly push on the inside and take it out a little bit, go up and down a little bit. Just give it a little bit of a bulge. So it's not so boring. Actually so I'm going to take my rib in my left hand and I'm going to push the lip in a little bit. We're going to totally change this mug and make it rounded. Pushing down a little bit with my pointer. Okay, it's getting a little dry with my sponge. Drip, make sure I'm getting it inside, okay. So my fingers are nice and slick. There we go. Pushing the top a little bit more with my rib that side. Okay so now I need to clean up the bottom more because it's a totally different mug now [laughter]. Get our pointy wooden tool. Compressing the lip if it looks like it is becoming a little uncentred I always come back to the lip because sometimes if you pull your hands away too fast it'll actually uncentre it.

So one more down here, scraping more away at the bottom with my wooden tool. Catch any flying bits. Still scraping, still shaving, trying to get the nicest rounded shape that I can. Okay. This is pretty good. Okay, now one more time with the red. Always want to either use a little piece of leather or I use my red rib to finish the shape, give it that last pass because it makes it nice and smooth and pushes all the sand that's in the clay back into it. Gives it a nice finish. Right it looks great so now a true undercut at the bottom. I'm just taking like the bottom quarter inch, eighth of an inch, truly want to get a little bit under there. Okay. Every little angle makes a difference at the top and bottom of the mug. Right, pretty good, okay. So now I'm going to give it a quick pass with the sponge on the top. Want to compress my lip one more time. Make sure it's as centred as it can be. I'm going to get my needle tool and I'm going to stick it underneath at the very bottom because this makes cutting the piece

off of the bat much easier if you already have a gap in there.

KHN: Yeah.

BD: So I'm just slowly sticking this underneath, slowly pushing it further and further in. And this little flange that's created at the bottom, I'm going to trim off later. Okay so it's a little easier to pop off. And sometimes your fingers are really the best way to finish a spot because that's where we have the most control, your fingers. Okay, mug is done.

KHN: Nice.

BD: So should I make the handle?

KHN: Sure.

BD: Yeah? Okay. So now the next step, ill pop this off. It's a nice little shape. Okay. So then pulling a handle, turn this off. Suddenly fly off. So then pulling a handle looks like giving a hand job which I've never done so...

KHN: [Laughter].

BD: ...that's fine with me but I'm very good at this so I might be good at that.

KHN: [Laughter].

BD: So I'm kind of starting to make it into a log shape, making it more and more log like, by kind of slapping it into submission and turning it like a quarter turn each time. Right, that's pretty good. So now I'm just going to use my right hand and squish it to lengthen it. Just squish and turn, squish and turn, gently squeezing. Starting to make like a coil almost. Try and make it as even as I can. Okay, that's pretty good so now I'm going to start pulling it. so I get my hand wet, then I get the clay wet, and I'm just slowly pulling down and I'm really using the inside of my pointer and thumb, that's really where most of the work is. But then you do use your palm, I will use my palm and just slowly... And I'm always turning, I always turn, trying to get it as round as possible to start and as you're pulling you're really using the slickness of the water, the fresh water, to pull the clay down. Okay, so it's long enough, so now I'm really going to start using my palm and really just use my pointer finger and my thumb and the space in-between. That's really the lengthening part.

I'm turning and I'm pulling gently, keeping it wet. Okay, turning, turning, and I usually do kind of squared off handles so now I'm going to use my pointer and middle finger and start squaring it off and I'm pushing on each side and then I turn because my fingers are shaped differently and do the other side. And I'll do the thin side a little bit and I am squeezing as I do this. The handles look a lot more delicate when they're a little squared off instead of just round coils. So this big knob at the bottom is kind of in my way so I'm just going to squeeze it off. Nobody needs that. Okay. Right, looks pretty good. Nice thickness and you do want to leave it a little thick. I always leave it a little thick around the bottom because it does look nice when you have your handle and there's a little more thickness at

the bottom and a little thickness at the top. Okay, so there's that, so then this should sit on a table top for a little while to dry. You want to let this sit up and dry for a while. This will just sit and you want to get it... It doesn't have to be completely in the shape that you want it to be but you do want to have it arching. Another way is to hang it off the table but this is a little sturdier because sometimes it'll just fall off the table if you just hang it off the edge.

KHN: Right.

BD: Yeah. So then this will dry for a little while until it's not sticky any more. And then I'll attach that to the mug.

KHN: Nice.

BD: Yeah.

KHN: Yeah.

BD: Is that it?

KHN: Yeah.

BD: Okay cool.

KHN: Thank you so much.

BD: How long did that take?

Interview with Clyo

20 April 2017, in the living room of their home, Berlin, Germany

KHN: Alright. Okay, so can you briefly describe your practice?

TC: The practice is called rope bondage, and it can be about tying someone up, it can be about getting tied up, or tying oneself up. And suspensions or not, floor work is just as much bondage. It's called rope bondage because I do it with ropes, you can do it with hemp or I prefer jute ropes. It comes from the Japanese shibari culture, but shibari and kinbaku in a Japanese format are more performance-oriented and these are, in my opinion, there's a whole lot of pornographic elements to it, that the European bondage scene, and also the way I want to express myself in ropes, does not involve. And it is a part of the BDSM culture, but for me it's not necessarily the same as 'playing' in a BDSM sense.

KHN: And does your work involve manipulating materials and can you talk a little bit about how that works?

TC: Oh, so maybe in two senses. One is that these ropes have their own materiality, so you have to work with them, you have to treat them, you have to burn them, you have to put some, maybe sometimes you have to boil them, you have to put some baby cream or jojoba oil on them. So you work with the material, but then you also work with different materials, so there's rings for suspension or carabiners again for making suspensions easier, but you could also do it obviously without carabiners. So that kind of, those add to the material aspect as well.

KHN: And then with the, since you do it on people, would you say that the manipulation extends to the body?

TC: It definitely does, on a physical level you can see that their bodies are restricted, their muscles, their nerves, the body elements of the body are also positioned in such a way that it creates a different sensory level, different bodily sensations. It can also be an emotional manipulation, especially depending on what the people who are being tied up or doing the tying, how they feel that they want to interact with those emotions.

And it is a tiring process to be tied up, so you have like... especially in suspensions it is stressful on the body, your hands might fall asleep in certain positions, and you have to like... as the person who's tying, you have to be keeping that in mind so that weight levels on the shoulders and on the hands change so that the hands don't fall asleep in the same position. The person who's being tied up, they have to be aware of their body's responses to certain positions and whether or not they're safe in the sense of permanent nerve damage.

KHN: Mhm. And can you describe your practice a little bit?

TC: So I, mostly I get tied up, and I tie myself up. Um, so when I'm getting tied up, it depends, I

really prefer, depending on my partner who is tying me, I would like to get their input because it is for me a process of taking up certain things, although I have certain preferences. When I tell them for example that I prefer having ropes over my face, I don't explicitly mean that they have to put it in a certain way. For example, if you're putting it over my mouth, be aware that I have two implants in my mouth. But the way that they put it over my mouth could be hard, loose, knotted, not knotted, over a scarf, not over a scarf, that sort of stuff is their creativity that I'm letting in, and when I'm tying someone up I sort of expect that they'll be open for my creativity, because it is something that we create together within the boundaries of each other. I also have my own boundaries when I'm tying, I can't tie certain positions. I don't feel like tying certain things on certain people. And that is very important, because if you work with creating immobilities and creating sensations and immobilities, physical and emotional. But when I tie myself up, I'm aware of both my own immobility and how I deal with that immobility. So it is for me like a process of creating a boundary for myself and trying to push it and cross it and see ... Currently... although I'm super interested in contorted positions for myself, like trying to see if I can give myself a hogtie, which is... I'm working on it. I'm also interested in tying myself up in suspensions that are really painful, so that I have to cope with the pain on my chest, while I'm tying my legs so that I can release myself from the chest pain when I'm hanging myself up by my leg. I used to do more hip harnesses, for the sensation and visual presentation of my body in the space, but currently I'm like... letting my sadomasochistic side loose as well and not just my sensationalist side. But I like both but separately.

And I don't... well I think this is a bit controversial, but I think the performance aspect of bondage is most valuable for me when it is self-tying. That is, one person interacting with the audience and it's a different art that someone tying someone up in a performance setting.

KHN: Really interesting. So thinking of the last time that you tied someone or tied yourself and felt really good about it.. whatever that means to you, or whatever... I don't know, have you performed recently in a way that you feel was?

TC: I mean, I have never performed in the official sense of performing.

KHN: Okay.

TC: Because I haven't gotten around to do that. But I have one performance idea that may be relevant that makes me feel good about the idea of performance.

KHN: So when you're doing something like that, do you think of the finished piece and work toward that or do you go kind of intuitively?

TC: I think for me, since performance is an art, it is a mental process, and I think of an image or a message I want to give to people, and I also... but this is a body performance, it is something I create on myself, so it has to also feel okay in the larger sense of the word okay. I can't do it for the message, it has to come from me and my body to give the message in this format.

One idea I had that I really, that felt super natural to me was that I was in a BDSM club here in Berlin, and I was doing some bondage with a friend of mine, and she was tying me up, and then when I came down I was like, I want to tie myself up right now in a cage that was hanging nearby. There was actually a cage and it was like... it was a cage that you cannot fit two people in, so you literally cannot do a two person bondage scene in that cage. I felt like I really want to tie myself up in this cage because it has this symbolic meaning of being like restricted, and I like working with restriction in a theoretical sense because you can... we are restricted by ourselves, by our body limitations, by the way that we were born, that's a birth lottery, and this is something I think about in my head, and the cage became for me, in a performative sense, an element that I want to... I want to tell that you don't have the whole space to do bondage. You don't have a free room with one ring. We are limited in the room and also in our bodies, because once you tie yourself a certain way, the motions are limited.

So I tied myself up inside the cage, it was like, it was a little bit taller than me, the cage, so it was pretty fine. And I tied myself to the sides of cage, and I fixed myself up in a baby-like position inside the cage which felt pretty... really releasing, in a way, it feels like in a womb but like... both restricted and immobilized, by myself and by my decisions, ... yeah. But I started with the message and went with the flow because I don't think of the end product in terms of what I want my body to look like, but I do think of the end product in terms of what I want people to ... what message I would want to give to people seeing it. Except for the message that they would take that is independent of me, because of course it's interaction...

KHN: Yeah...

TC: But that would be my "author's intention". I hope I will get to actually do it in a proper way and maybe even record it.

KHN: Are you planning on doing that?

TC: Yeah, but I'm not sure if I would be able to do that in that BDSM club.

KHN: Mhmm.

TC: You never know. I'd have to ask. I definitely have half a mind to go in there again but then again... it's mainly a heterosexual scene, might not be... if anyone has a...

KHN: I'm sure you could find one in a queer setting here.

TC: Of course, but that cage was perfect. It was like a bird cage sort of thing.

KHN: Ooh.

TC: Yeah, it's not one of those standing cages, it's like a bird cage... circular, that is hanging in the air, so that had a sort of... you know.

KHN: Ah, that's beautiful.

TC: Thank you. Well if I talk too much about it it starts sounding cheesy.

KHN: Yeah, it's always hard to talk about a piece you want to make before you've actually made it in the way you want to make it without sounding over... yeah, I understand. So when you're um, when you're tying, do you think about specific actions you need to take to achieve a result you want or do you have another process?

TC: Actually in what sense?

KHN: Like when you're thinking about something you want to do, do you just kind of go with it or do you go, I need to do this thing, and then this thing, and then this thing to make this happen.

TC: Well, there is of course the main thing is there are safety concerns, like you have to do certain things to be able to hang someone up, and if you do it in any other way that puts them... I mean there are different ways to do that but if you do it out of any one of those ways you put them into a risk that... I don't feel comfortable with because I wouldn't want anyone to be putting me in a risk. And that's why I follow that certain harnesses have certain ways of making, you cannot make them any other way around, you have to have a different harness to accommodate that person, which I'm more than happy to do. Like because I... for example, I'm not a very skinny person, but I still feel like I'm within the limits of doing certain harnesses that wouldn't hurt my shoulders, but certain people over certain weight limits should not be put in those harnesses because those are not designed for their bodies. They should be put in different harnesses, purely for those safety reasons. And also, certain people have body limitations because of nerve damage, sports, spanking... so you can't really, if someone has a huge bruise on their leg, you can't really push into that bruise-

KHN: Unless they want you to.

TC: Unless they want you to! Yeah, but after awhile it might be too much nerval [sic] damage. You can overdo that and with certain people and with certain bruises I wouldn't want to take that risk.

KHN: Yeah definitely.

TC: And um... other than that, I come with certain, depending on my interaction with the person, I come up with certain stuff to do to them because that is how that is triggered in me. I want to tie them up because they have this beautiful hair, so I want that hair to be inside the upline. They have these beautiful feet, so I want that feet to be visible in a certain way or you know... their calves look so good that I need to bend it, that's what...

KHN: Yeah, the parts you want to highlight.

TC: Or sometimes I want to create sensations in them. Like I want to blindfold them, or I want to, or I want them to be super aware of everything and I want them to annoy them, or so, that would also be a... [laughs] You know, I want to hurt them mostly because they like being hurt, but also

mostly because I get something out of hurting them in that way, so I want to push their bodies to a different limit, because the pain involved is not the same pain in bondage is not the same pain in impact play, it's endurance pain and some people, including me, really like that. Yeah.

KHN: Mmmhm. Do you feel like there's a difference in that pain in relationship to when you're being tied by someone else and when you're tying yourself?

TC: Yes, in the sense that if I'm... if someone else is tying me up, they can only assess my pain limit and they have to work with that, with my input, along with my input, it's not like I lay down and tell them only at the last minute. But I usually, in certain difficult positions, not in playing but in practicing especially, but also in playing, I like to give input in the way that it makes sense because it's a ... the physical limitation of it concerns the health risks in those pain terms. But the uh... when I'm tying myself up, I'm better at assessing that so because I'm hurting myself I can make that pain, I can choose to make that pain go away in a safer way. I know the exact limit.

KHN: Can you list five verbs or adjectives that are important to how you manipulate materials? So I'm looking for action or describing words, not nouns, like 'rope'. But like things that you do to the rope or the person or...

TC: So tying would be one of them probably, but doesn't have to be... Restricting. Flying. And um... there's a word that I haven't thought about, that I haven't thought through, falling, but not in the sense that you drop someone accidentally, but there's a falling, dropping, in an emotional and also physical sense, you literally fall onto earth after you've been... you know. And um...

KHN: Actions you do in the process of tying?

TC: Touching. Actions.. tightening up. And... maybe more like hanging? That's very crucial as well. Contorting. Maybe.. would 'intending' be one of those things?

KHN: Yeah it could be.

TC: Yeah, I mean like communicating intent, I mean communicating is obviously one of those things. But I was thinking more like physical stuff, action-action not like ... yeah, these would be..

KHN: Great! What do you feel like was the most important skill for you to learn when you started?

TC: Skill? Oh, uh..

KHN: In terms of like physical the physical manipulation aspect?

TC: I think for me the most important skill was for me to learn to be able to communicate what and how certain things feel, like precisely when I have my hands at the back and when they're tied up and when there's pressure on my shoulders my hands start falling asleep. It was really important for me to learn to communicate when that pain, when that numbness or the bite-y feeling, when that was nerval damage and not just... okay... so I had to learn to communicate that was.. or like which body

parts hurt, it's not just like oh my body hurts, it's like 'my toe on the right foot hurts a little' because maybe, you know, check up on that.

KHN: Being specific and descriptive...

TC: Because that is important, because it's, I mean, it is.. bondage is one of the most dangerous aspects in... within BDSM scene, because you can of course hurt people incredibly by hitting them and hitting their nerves, but with bondage, even in the softest version of bondage you can hurt someone in a very irreversible way. There are cases of people not being able to hold things after they come out of certain positions and I don't want that happening to anyone.

KHN: Uhuh. Okay, hold on. Alright, okay, starting again.

TC: The equivalent skill in tying is to ask for these things and to work with the responses without that being, without that breaking the flow and the emotional... because that is also a form of practice, a form of fun, to check up on certain things.

KHN: That makes sense. Can you change or reverse modifications and if so can you describe that?

TC: Modifications like?

KHN: When you're tying someone or tying yourself.

TC: What do you mean changing modifications? Like modifications to harnesses, or?

KHN: Yeah, like if you're making a harness and you do something you don't like, can you...?

TC: Yes, but I would have to untie the harness. Like with harnesses especially, they're fixed, and depending upon your level of experience, you can learn to change certain things in harnesses, and fit the harnesses to your own body, for example, there are loop harnesses that you can put two lines on the hip and two lines on the legs and then that sort of a construct, you can do that with three lines [of rope] if you're going to hang longer. It hurts less. You know like... I learned that in class actually, I didn't come up with it. But I did modify a chest harness for myself once because I wanted it tight once I was in the air and I didn't deal with the rest of the... it was a two part harness just on my chest. I just tied my breasts up and put the pressure on my chest and didn't think about the shoulder part because I didn't feel like it in that moment, which was fine, so. It turns out that it's just also the length of the harness.

KHN: Okay. So now we can start the modification part, or, your practical part. So while you're tying yourself up, if you could describe what you're doing, like the actions you're taking, as you do them.

TC: Okay.

KHN: And I can prompt you if necessary.

TC: I feel like using two ropes because you know...

KHN: **Because you can?**

TC: Yeah exactly. Because it's, you know, almost 1PM so I don't need to overdo a harness. I'll be teaching some harnesses this weekend.

KHN: **Oh, nice.**

TC: Yeah, self-suspension class. So when I do this, I just opened it, it was coiled, I just make sure it's in the middle. And um, it's as if I'm tying someone up, I'm thinking what sort of a sensation do I right now feel like having in my body. And usually the easiest way is to... would be to start with some kind of a solid point on the body, so I could just tie my hair up, although I'm not sure how successful this will be. If the hair is clean, it falls off the ropes super easily, it's incredible.

KHN: **So what are you doing to your hair right now?**

TC: I just put a lark's head [knot] over my hair, and I'm gonna twist it and have it up like a little hole, and while I'm holding it I'm going to pull my hair through. This is the most fun, when you can actually fix it to a point and pull your own hair. I actually tried to suspend myself by hair once. I couldn't handle it, so I did a halfway thing, the hair, fix it up, and put it through my crotch and hung myself up with... hair-crotch-rope. So this is how I fix my hair. If it goes too much in the upward direction I know it's going to get loose, because clean hair. Yeah, that happens when you... shower. Just... What I actually feel like doing is going through my mouth, but then I can't talk. So I'm not going to do that.

KHN: **The fatal flaw of this interview structure. [laughter]**

TC: So I'm just going to go through my body here, my upper body. This is maybe not the fanciest thing to do in front of a camera, this looks a bit... this is not like pro modelling. But I like that.

KHN: **So what are you doing to the rope there?**

TC: So I just put like a little half hitch sort of a thing. And I'm just checking the position of my neck. Do I like this position? Yes. And I just went over my chest, now I'm going to go under my chest, and um... if I can have my rope from my body. It was stuck. And I'm just going to like... squeeze it here and pressure some breathing, and now go under my leg, and again I did like a half hitch sort of a thing here, I'm not sure about the name, to fix the point. And I'm just going to close up, tightening on my leg, and hold it with my foot here. I need, you need, to learn to use the toes because otherwise it's hard to have to hold it with something. Or the mouth. I halved the rope that I opened up before, half the rope and I have a little thing in it so that I would know where the middle is.

Now I'm going to extend the rope, do this with a little lark's head, take the rope ends here, pull the one tying my hair, they're not the same length, that happens often with self-suspension that you end up not with the correct ropes in the end. Which is sort of embarrassing, but it's fine as long as it's not the suspension upline. So I extend the rope, put this in full tie, and I'm going to have my leg up like this.

Go through my finger [toe] ... and... at this point, basically, my body's positioned, my upper body's positioned in a certain way so that there's not much I can do to change that. So instead I work with my lower body and I make some tights here. And so I'm thinking that I want to come up somehow so I go over the leg again. Maybe I want to incorporate my shoulder. And... I have only this much of rope left and I'm really close to my face, so I can always go through my neck, and go through my face and ... in a way... and... now I'm just going to finish up here because my rope is out and yeah this sort of a thing. I mean normally I would have, if I was doing it alone, put this [rope] over my mouth and this over my eyes to just you know, sit around a little. At this position, I didn't really think about it, but I'm holding this leg, so what I really prefer is like having the leg in a position that I don't have to hold, maybe this is like way nicer. But I like losing myself into the ropes. But yeah, this sort of stuff. Ta da!

KHN: Very nice.

TC: Just remember where you finished. And I'm not like having big big big knots when I'm tying myself up, because you know like I don't want to forget how to get out of them. But you know in suspensions of course I'd have knots. For this sort of a thing I like frictions because frictions work wonders. Like it is incredible, if you have the right pressure and directionality on a friction, how much it can just simply hold. You can tie someone up based on frictions as well. Sometimes I am coming up from, when I'm trying to untie myself from an upline, and even when the knots are over the upline is still holding, because of the pressure and the directionality of the pressure.

So when I untie myself, I know where the middle is so I put a little thing in the middle, so I don't have to like, try too hard later. And... you have to be a little bit careful with the untying because if you get too overly enthusiastic you might just pull and push things that you don't necessarily want to pull and push. Like your hair too much. And with this one I do the same. Or I can show you how I coil the ropes. Which is also... which is also very important because... 8 meters, you don't want to be...

KHN: Sorting through it?

TC: Yeah. So basically I, so what I do is, I hold it... well I'll show you again with this one, that wasn't really much demonstrative. So I hold these two ends in my fingers, and some people do it like this, but I like doing this to my arm because it feels more... it's like the right length for me to keep the ropes. I learned it this way, I got used to it this way. It's a question of being... like most people don't like other people coiling their ropes. Which is perfectly fine. But you know, I don't really mind other coilings as long as it feels okay. I mean this is always the way I show people how to do it. And then go like halfway like this, just here, go around once and go up against the coming direction, and then you like fix it there, and then start going upward again, pulling [the knot] down a little, and up, and up, and you have this... you can also do it in the middle, I like it in one of the ends. And I put two fingers in, and I go over, pull it, push it, pull it, and fix it up, and I have this sort of... this sort of a thing. So this is so that this here is basically the middle of the rope, so I can just, when you do it, you always do it in lines of two. So you really should have the middle.. this is very easy access, I can pull it open, and I

have my ropes. [12:45] Oh my god, I did this for the camera, I was showing off. So this sort of a thing, you know the people incorporate these sort of artistic elements into their tying.

You know, I kind of find it interesting, to work with these.. because and then the positions, someone preparing ropes can feel different than the person getting tied up. And I consciously avoided the words like 'rope bottom' 'rigger' 'model' 'rope top' 'dominant' 'submissive' because I think those are words that should be negotiated in terms of how people feel about what they're doing in a partner setting, and I do consider myself as tying myself up, and when I'm tying other people up, depending on my sensation with them, they're not necessarily my 'submissives' or my 'bottoms', they might be people I'm exchanging rope sensations with on a more equal basis than that. So yeah, I just wanted to note that. Most people will be like the Big Riggers or whatever. I'm not sure if that is a word I would use for myself. I do rigging, though, so.

KHN: It's not the power relationship you're looking for?

TC: It can be, right. Like I have had people that I've given control to over my body in bondage, and I have had people that I've taken control. But it's not with everyone, and it's not a must for me. It's more important what we create and if what we create is a power dynamic, and if both parties are fine with that... which I rarely am, I'm not okay with everyone creating a power dynamic with me. Yeah.

KHN: Yeah. Okay, do you have any other comments you want to make?

TC: No, not really. I mean if you want I can always talk more about the humiliation aspect or bedroom bondage stuff. But that's not what I do like... you can do a lot of humiliation in bondage, they're different Japanese styles for humiliation, you can do bedroom bondage, like certain positions that work so great, in sex or in play. But those are not really the 'art' for me, in the terms I consider to be art. I mean they're artistic, they have a kind of talent...

KHN: It's just not what you do.

TC: Yeah!

KHN: Alright, thank you so much!

TC: Thank you!

Interview with GeoVanna Gonzalez

13 April 2017, in her studio, via Skype

KHN: Okay. Great. So that looks good.

GG: Yeah?

KHN: Alright. Let me get rid of... Okay. Perfect. So I guess if you could start off by describing your work a little bit, and kind of what your practice is like.

GG: Yeah, so my practice is quite installation-based, and sculptural-based. A lot of it has to do with the construction of identity and also re-appropriation, so representations of whole selves and their existence within the real and the virtual world and also how those two worlds aren't actually separate but are in unison with one another. And kind of how between those lines blurring... what sort of dialogue is addressed through it and what sort of issues arise and ideas of representation. So representation of your identity, representation of your gender, like an object of artwork... essentially kind of how it's, I feel that it's kind of hard to differentiate between all those things because of appropriation and... sort of the idea of objectifying anything, so either like objectifying humans or yourself or your environment or nature or technology.

Yeah, all of those things combined, and sort of like, a major underlying thing that always arises in my work on a visual or aesthetic level: I'm really interested in being able to sort of tap into all bodily senses within an installation. So like I'm definitely concerned with not only the visual but also how the environment affects what you're listening to, what you smell, how you feel inside of the space. So within that there's always.. I wouldn't necessarily call it interactive, but like, these things are within the air. So I'll use sound, I'll use scented fragrances, as an example of an installation. And with all of those things, it's very much about using synthetic materials that have been made, usually things I've actually made, to mimic things in nature. So this idea of replacing the natural world, or even using our own natural bodily senses with the synthetic which is kind of constructing and also a critique of how we're always trying to perfect things to our most comfortable... way of living.

KHN: Yeah, that's very cool, and I feel like the work I've seen you make... I understand a lot more now on a personal level which is nice. So within that, does your work involve manipulating materials, and if so, can you kind of describe how that works with different things that you work with?

GG: Yeah, definitely, and ALL of my work is about manipulating materials. Like everything, every material I use, it's about me trying to transform it so that it appears to be something else. So it's not even that, and again, that goes back to this idea of the synthetic versus the natural and the appearance of like, sort of the idea of camouflaging. So I use this a lot either aesthetically or also when I'm contextualizing my work so when I'm manipulating material it's always about camouflaging material,

like how close to the real thing can I get. Also, I take out all of the functionality of the real. So an example would be, from one of my past recent exhibitions, would be a synthetic plant that I manipulated and painted and put patterning on top and created it in a way where it seemed like a real plant. I can send you a photo of this afterwards for reference if you want, but I did these C-clamps, which are typically these... it's like a functional tool that's meant to hold things together on a very basic level, and what I did was make a bunch of resin casts of them, which then makes them unfunctional. It's not serving any purpose, the plant's not serving any purpose, it's not like growing, it's not like helping the environment or anything like that, it just has it's aesthetic appearance. In some way, I feel very much how we perceive the world and our way of existing is not that we actually need these things but the appearance of them is satisfying enough or even more satisfying to have around. Yeah, and let's see, a lot of the past sculptural work I've been doing has been using a lot of acrylic glass, plexiglass, and there's a lot of manipulation in that. So there's manipulation in bending and shaping and trying to take this like rigid material and make it as fluid and organic as possible. It's like one of the most inorganic materials, you know, plastic, like it's one of the most inorganic materials that we have. It's like it's constantly trying to mimic the organic world in that way.

KHN: So thinking about the last finished work that you made, whatever that means in terms of your practice, did you conceive of what the work was going to be before you made it, or was it kind of a more organic process for you, and is that typical of your process?

GG: Well my work is very much research-based, so I think like I start off with the idea, and then from there kind of I think intuitively the materials come about. So it's a combination of both, some stuff is planned out and constructed in a way I visualize because I'm creating an environment so I plan out like how the space will look, but in the process of doing that there's lots of things that just naturally float in by themselves, and... in the making, in the process, all the dots start to get connected but it's quite intuitive. It's hard to explain, but in the back of my head already some of the things I would gravitate to those things because I knew subconsciously that were connected or something like that, and this for me is actually one of the most fulfilling parts of my practice when these moments happen because yeah, it just happens naturally, and, in a non sort of -romantic way, it's a very beautiful thing that happens in that way, when those things sort of evolve naturally by themselves.

So yeah, I do a lot of pre-planning, there's a lot of writing that happens before, proposals and things like this, and the research aspect is a huge part of everything that I do. I think for this recent exhibition, the work that was in that show was kind of a combination of work that I was building in a year's time more or less, so there was a timeline happening and... yeah, like I guess I'll kind of work in big series, like I'll have like multiple things but they'll kind of get grouped into series of things. They're all interconnected at the end.

KHN: So like when you make a proposal for something, and then you have kind of a delay in putting that on, do you feel like that idea shifts for you in terms of concept?

GG: Um, I wouldn't necessarily say that it shifts, but as time goes on and the more research that I do, it gets more developed in that way, and I think that a lot of the times like even in the moment I have this idea and I have it all figured out, but putting the extra time in, just to let it sit, even if I'm not working on that thing in particular, it has the time to evolve even more. More things will be going into it, and it makes the concept stronger and everything. So having that sort of downtime in that way is necessary for the larger project proposals at the end of the day.

KHN: When you're thinking of, something that you have the idea of making, do you – when you're thinking about how you need to manipulate things or how you want to achieve that, do you think of specific things you need to do to make that happen, or does it just flow for you? That was a really non-professional way of saying that, but I guess we should say: does it flow more intuitively?

GG: I think it flows more intuitively. I think there's some things that, depending on the material, you have to follow a certain formula for it to work. Sort of like, for things to be activated. SO those are practical, formalist things you just have to do. But more or less it's intuitive, like the more abstract sculptural stuff that I make, and that's more intuitive. The shapes they evolve into, the structures in all of that and the color palette. The more formal stuff is quite intuitive once I get started.

KHN: If you could think about your practice and the kinds of things that you do, and think about five kind of verbs or adjectives that are really important to the way that you work. So, I don't mind if they're verbs or adjectives, just not nouns, less about the thing more about the action or the thing you're trying to create.

GG: So verbs or adjectives about the way I'm creating things?

KHN: Yeah, about the actions you're taking, the manipulations you make in your work, just like generally.

GG: I mean, I think it's 'physical', it is physical, it's quite bodily, and I think within my work I'm interested in... okay, I'm just talking now, I'm sorry. But I'm like...

KHN: That's okay, if you want to talk and then be like, oh, that's one, that's fine.

GG: Yeah, I think I have to do that. I'm interested in sort of how to leave like the artist, i.e. me, 's DNA or identity behind. Right now, it seems like we're as a society or culture, not interested in leaving any form of identity behind in some way, and I'm kind of interested in how it is that I can do that in the material that I'm using. So in glass, for example, because of the bending and shaping of the material and the physicality of it, you can't actually replicate those things, not like to the T, and there are imprints left behind, which are fine, and that's kind of the fascinating part for me, those imprints of my touch in the materiality is important for me. I think clay does that beautifully, in that it picks up all the little things within each individual's touch. Let me think what else. I don't know. Can you give some examples maybe?

KHN: So something that's really important for my work because I do a lot of embroidery right now, and a couple actions that I think are really important to the way that I work in that is the idea of like, building and pushing. I feel like I spend a lot of time pushing the material, and building stitches, and kind of making texture. That kind of thing.

GG: I guess I bending and shaping are really big things that happen. Yeah.

KHN: Okay, do you feel done with that? If you have more you feel like you could add, please go ahead.

GG: No, I feel pretty good about it.

KHN: Okay cool. So what do you feel like was the most important physical skill that you've learned over the course of your practice?

GG: Most important... hmm. I think being able to build things!

KHN: Yeah, yeah.

GG: Like just on a very basic level, like be able to use like power tools and build stuff is quite important. It's a universal tool that is necessary for, yeah, even everyday stuff. And... I mean also painting is a huge part of camouflaging and manipulating materials, through paint in general. It's a huge thing. Manipulation of like, how you use color, color theory. Within paint itself, you can make wood look like marble or vice versa and those are very... they're not necessarily basic tools but they are the fundamental tools that are there that every artist starts off with.

I think in a way, even outside of my own practice, I think other artists work that I really admire or appreciate are artists that use manipulating material. So artists who use things that you find on the street or in a supermarket or a convenience store or ... and manipulating those materials, I think that's... being able to do that is actually a really great skill. It takes.. you don't need a lot, and I think that's also really important to my practice, using the scraps of whatever is in your own environment. I've moved a lot in the past few years and each place that I've been living and working in will always influence my work, and that's also part of my work, is extracting from the environment that I'm in and it's providing me, and seeing how I can manipulate that material in whatever way that I need it to be. And I think that that's a really big skill that I appreciate and am constantly trying to develop and work with, just using whatever is preexisting around me if that makes sense. So found objects, scrap pieces, leftovers, yeah.

KHN: Yeah, that makes sense. In the way you work, can you change or reverse manipulations?

GG: Yeah. Yeah I think... changing or reversing? Like once I manipulate it I can go back to like the original form?

KHN: Yeah.

GG: I would say not for everything, no, no no. I'm also never, I don't know that I've ever really been interested in doing that.

KHN: **I think it's harder to do with physical materials than it is to do digitally.**

GG: Exactly. I think that's a dangerous, or a hard, part of working digitally. You have this power of going back, and in a way it's almost like going back in time, like if you could reverse a situation or an action in your life. That's pretty dangerous. I also think that it's not necessarily the best learning tool to have that much freedom. In a lot of things in life, the ability to fail and learn from your failures... if you have that much control you're not really allowing yourself to take those risks and chances or evolve, and I think that for me at least, within my art practice and even within my life, it's about taking huge risks, and not being able to go back, committing to that decision and whatever the outcome is, it just is, whether you agree with it or think it's great or whatever. I think it's important to let those things exist how they should exist. That's just me thought for myself, how I work.

KHN: **That makes sense. So now we're at the part where you get to play with the clay, which you're already doing which is awesome. If you could just kind of interact with it in a way that feels natural to your practice and verbally describe to me the actions that you're doing, in whatever way that makes sense to you. That's not right or wrong and that's not a part of my research at all.**

GG: So I guess since I've been, since I've started the interview, I've been just kind of touching the clay. I guess there's a lot of pushing and pulling and pressing and sculpting, but I think there's a very meditative sort of thing that happens within playing with this sort of material, because it's so fluid. It takes form and shape however you want, like however much pressure you apply to it. What's interesting about this material is that if you are using your hands it's very hard to get geometric shapes because your hands are organic and the material is very organic, so if you wanted to sculpt it [like that] you would need to use specific tools. Yeah, I guess there's a lot of like stretching and pulling and like collecting, collecting the material back and like into itself.

KHN: **What are you doing right now?**

GG: I'm just pulling it back, little by little, just with my fingertips, and then it sort of collects to the side. And then I'm just pushing it. Yeah, and then folding it into itself. Yep. A lot of pushing.

KHN: **What do you feel like you're doing to the texture of it there?**

GG: It's making it softer, softer and more elastic, and maybe thinning it out a bit. My hands like, the more you touch it the more you are absorbing the moisture, the natural moisture that is inside the clay, so it gets a bit more drier over time. A lot of just, squishing it into itself. Yeah, I don't know. I mean this like, this material, because it is a natural material, I feel is irreplaceable, you can't have the same experience you're having here, you can sculpt on a computer but I don't think it's the same. It's interesting because each part is this kind of consists of your fingerprints at the end. Yeah I don't know

if I have anything else really.

KHN: Yeah, I guess the fingerprints are a very tangible trace of you having interacted with it.

GG: Exactly, fingerprints and fingernails. Those are, that is probably the biggest thing. And it can't really go back to its original state, essentially it comes in this block, and that's never going to happen really again. That whole thing about being able to revert back to its original state, I mean you can get close, but you can't really go back to the way it was manufacturally made.

KHN: Okay, does that feel like you've described it enough for you?

GG: Yeah.

KHN: Okay, I have one more question for you, and then I'm going to ask if you have anything you want to add to what you've said before.

GG: Okay.

KHN: My only other question is if you teach or have taught at any point, particularly arts practice?

GG: Ummm, no.

KHN: Do you have anything to add to what you've said in the course of the interview?

GG: I don't think so. Do you have anything else that you feel like you'd... like to know?

KHN: No, I think that's all been really helpful. I've been especially keen to talk to someone who was working with clay, so I'm glad that's what you ended up working with.

GG: It's interesting because it shows up subtly within my sculptural stuff but it's one of the materials that is kind of the backbone of other things, when it comes to making molds. It's a part of the process but it's not always in the forefront of the finished product. It's such a sort of material that can be used in so many different ways. It's just a fundamental starter, it's a necessity for a lot of sculpting at the end of the day. And I think it's also an undermined material, like clay practice, people who actually do ceramics, it's very undermined. I think it shouldn't be. It's one of the most tactile practices that still exists within contemporary art. I think it should be appreciated a bit more. I'm really interested in it as a material at the end of the day. And it's a material that can be manipulated in so many different ways. I think that's very much connected to the ideas that I'm interested in within my practice.

KHN: Yeah, I think that makes a lot of sense. I'm really happy with this, thank you so much.

GG: Yeah, no problem!

Interview with hari_klia

19 April 2017, student studio, Universität der Künste, Berlin, Germany

KHN: Alright. So, could you briefly describe like what your practice is in terms of materials and in terms of yourself I guess as well?

HK: Yeah, that's also a good point because I also do performance art, but not exclusively. And I, so I just started to experiment with a lot of new material. Before that I really mostly just used, general ideas that I would then transform into, okay what can I use to transform the idea.

So, for example I had a happening performance interaction thing where I went into a public space and I build towers out of sugar cubes for a couple of hours. So, you could say in this moment it was sugar that I used, but mostly it's my focus was rather on me being there, building something that is not meant to stay, or that will fade at some point, or just fall apart immediately.

So, that was how I used to work, maybe like a year or two ago, or two years ago. And right now, I experiment a lot with jibs ... I just need ... plaster, right the white thing and concrete. So, those two things I just like aesthetically and how they are ... how they can be used to make forms out of them by filling things, so you can ... Ah, just English is a bit harder than German.

So, you don't have like a plastic in German. It's you have something, and you carve something out. So, then you have a sculpture, but it is a plastic. And ...

KHN: Like a mould or?

HK: A mould?

KHN: Are you talking about the form or are you ...

HK: Yeah, for example you have a stone and then you carve things out and you have sculpture.

KHN: Yeah.

HK: But that's a different method than when you built the negative and then you fill the negative ...

KHN: Yes.

HK: ... with something and then you have also the sculpture. But the starting point is very different. So, I haven't worked with the first one yet, so when you have something and then you carve something away, and so your sculpture is there all the time, but you just to form it. I just worked with things that I made out of material that you have to either mix or build your self, so it has a form in the end.

And right now that's concrete or plaster for me. And I experimented a little bit with drawing and painting too, but I just, sometimes it looks good, sometimes not. But I just don't feel any emotional

connection to those works. So, I let it go too.

And so, when I do performances with my own body, I guess its material and then everything that surrounds it, so I can transfer my message is also my material. So, also, my costume I would say is a material. For the street thing I was mentioning with the sugar, I tried to just wear very neutral standard clothes, pants and shirt. And it was a sunny day, so I also wore a hat. But it was just because of the circumstances.

But when I do performances on a stage with a crowd and I have a like a choreography already planned and a timeframe, I definitely think of a more theatrical costume. And I really like morph suits a lot, so I, because it has this anonymity and a very nice beautiful texture, and if you, yeah if you maybe also hide your breasts, or move in a certain way, it's also very gender ambiguous.

So, I like that, that you are such a ... you're just a human body, but very neutral and nobody from the audience can project anything on you because of your looks, which I also like because I like people to think of my performance on one side as an art piece that is just maybe nice to look at, it is aesthetic, but also that they can put themselves into it and maybe learn something from it because they connected with it. Yeah.

Is that too long, or okay?

KHN: No, that's perfect.

HK: Okay.

KHN: So, can you talk a little bit about how your work involves manipulating materials in a very general sense?

HK: How it involves manipulating material? Okay.

KHN: Yeah.

HK: So, when thinking about, but interrupt me if that's going to a wrong direction.

KHN: Sure.

HK: So, thinking about concrete for example, or plaster, I guess I buy the raw material which is just either some powder, or dusty stuff, or sandy stuff, or with the concrete it varies. And grip I guess too.

And then I transform it by adding water to it and this makes it very fragile as well, because I, at least needed a lot of experimenting to find the right water amount that I add. Or, also with concrete, you mix cement with the sand and the water, and then, what depends on how you like your ... you would like to have your final product, how soft it should be, or yeah, or not. You just vary the measurements I guess.

So, wait, what was the question again? How I?

KHN: How your work involves manipulating materials?

HK: Manipulating, right. And ...

KHN: Working with, interacting with.

HK: Okay.

KHN: Yeah.

HK: So, I guess with, I did once a performance where I wore a white morph suit and I sewed in magnets. And, then it was during an exhibition of friends and acquaintances of mine, who build sculptures out of steel or metal in general.

So, my performance was walking around, dancing and interacting with those sculptures, but being always like stuck to them also. So, that's how I kind of manipulated the ... my body as being also a material and the costume I wore. And because of one, some sculptures were a bit lighter, so also their positions were manipulated in this situation.

And it was, the exhibition was in the workshop of the people who made the sculptures. So, a lot of iron dust or steel dust was still lying around. So, wherever I had the magnets, I in the end had just black dots because especially those spots took the dirt in the end. So, that transforms it and manipulates.

Yeah, I guess, I just think of maybe ideas. And then I think, how can I work with materials to make this idea happen. So, I had this idea about I had a relationship to process. and I thought about, yeah, being torn to somebody, or yeah attracted to somebody, but in the end because it wouldn't work how it is also, yeah pushing you away.

Thinking about the magnets, plus and minus opposites, and also one sculpture was just made out of spikes, out of steel spikes. And that was also a part where I hugged this bear and definitely had the spikes on my skin also, but the magnets they didn't let me go. And in the end also the fabric didn't let me go because it all was intertwined. So, this, I guess concerning the performance or costume part.

And the material was so hard to grasp. Also, depending on what I am working with for one piece, I just had a photo series and I called it 'Eat Pussy', and I took fruits and one vegetable that looked when you sliced it in half like a, or it resembled a vagina, or a vulva better to say. And, then I, yeah, for the pictures, I licked it and ate it.

KHN: [laughter]

HK: So, I also put the material inside of me in the end. But if you would say, the art piece is only the picture then it's something different I guess. Because the picture is then standing apart from it. And it's just about the aesthetics and the meaning that the title gives it. And yeah, so I'm not eating the picture, so it's not, you could say, the art is not inside of me, but maybe the process, how I ate the fruit.

And now what else could I say. Ah, yeah, maybe, I'm thinking of a couple of pieces I did. For one

video piece, I again, transformed maybe myself and my surroundings because I undressed on Tempelhöfer Feld, this huge park in Berlin. And it was winter-time and the snow was lying. So, I got naked and I guess I transformed my body because I took off my clothes. But I also transformed the surrounding because of the warmth of my body, the snow melted a little bit. And, but the snow, or the weather itself was so cold that I transformed myself, because I just dropped a couple of grade ... not grades ... Celsius, degrees.

KHN: Yeah.

HK: And, yeah, I thought I would die, just because I was out there for 40 minutes. So, it was quite crazy. A self-experience I guess. So, and sometimes yeah, I work with involving audiences sometimes in the ... now mostly when I do stuff on the street or outside, or when I do it with strangers, so I guess I also, I take them out of their comfort zone and confront them with things. Which for me, is like a task to make them think about things they wouldn't rather think about, or in ways they wouldn't think about. So, I guess maybe, I transform the material audience.

KHN: Yeah.

HK: And manipulated is actually very good for this example with the people.

KHN: Has kind of a double meaning huh?

HK: Yeah, I'm manipulating. (laughter) I trick them. [long pause]

KHN: Okay. I feel like you touched on this for a second, but just to clarify, when you make work do you think of it as, like do you think of a finished piece you wanna make and then make it, or is that process a little more maybe, "organic" for you?

HK: Yeah.

KHN: Like how does that work?

HK: So, usually I ... okay, there are actually two ways. Sometimes I just find stuff. And then an idea comes into my mind because I have this object and then I make something out of it. And the idea for the end result comes during working with the object.

So, I had form where once I bought a dildo and it was delivered in a beautiful plastic form, and I used the form to make plaster and concrete dildos out of it. And then, I thought about okay, what can I do with it. So, that was the start of my experimenting with the material, and, but I didn't wanna just throw it away, so I thought okay, I could make an installation sculpture out of it. So, I put them into boxes and made it like a, call it the Phall with the PH, and so yeah I used it for that. And it symbolises maybe the fall of patriarchy or something like that.

But its, I see that when I start like this my final idea is not as fixed or thought through, well thought through as when I start with the idea and then walk the way to get to the end result. And when I have an idea and I have like a, okay, something I want to ... a message, I want to bring out there for people

to hear about, then I usually think, okay, how can I make this happen.

And then I start to think start to think about maybe more of a situation and how it will, or I maybe go into the position of the audience, and I think of, okay, so how is the society right now as I think it is and, how would I like it to be. And then I rather think of, okay, so this would be a thing that I need to do in public with strangers. And then I think, okay, what should I do then and how can I interact with the people without disturbing them too much. Because I don't think that if you point fingers and make people feel bad then you actually achieve the opposite.

So, I rather try to work with positive interactions and, yeah, having people interact in a way that they feel comfortable with also and I don't force anybody to do that.

So, my process then would definitely develop organically and also through talking with other people about my ideas. And then maybe they would think of something I haven't thought about yet. And, so the sugar cubes actually started out as wood cubes, but that didn't make sense in another way because it wouldn't fade away enough. It would maybe just fall, but in the end, I could like pack it and go away again. But I wanted it to stay there and just, yeah, dissolve on the grounds, and maybe have also a little bit of an after effect when people would walk by and see a little sugar tower and just wonder what it is, yeah.

Is that well enough, or do you want to ... okay?

KHN: Unless you have more to say.

HK: No. But if it's something is not clear to you, you can definitely ask second questions on, yeah.

KHN: Sure. Thanks. [long pause]. When you're making work, do you think of specific actions you need to take to achieve a goal, or do you move through that process, you know without imagining different stuffs?

HK: Again, sorry, when I start to work on a piece do I think of how ... no, again, sorry.

KHN: So, say that you want to like, make a specific thing happen and you know what that goal is, do you think about specific steps you need to take? Like, okay if I'm gonna do this, I need to do this, and then I need to do this?

HK: Okay, but do you mean in the end result, or in the preparation for it? For example, during a performance, do you mean like what do I do before I have the performance, or what do I do within the performance?

KHN: Yeah, I guess this is maybe a question that's more relevant to like the physical work ...

HK: Okay.

KHN: ... than performance ...

HK: Okay, yeah, I got it.

KHN: ... in some sense, but you could also apply it to performance.

HK: Okay, yeah, I mean, yes, definitely I have to think about what I ... what just logically would make sense to do next and before. For example, it would not make sense to build a box, seal it and actually my end result should involve having a ball inside of the box.

So, first I have to maybe make three, or like whatever, leave one door open definitely and put the ball in, and then shut it, and then seal it maybe. So, I definitely think through the stuff that I do before I finish it.

Sometimes things come up because something doesn't work as I planned it to be working. But, yeah, I definitely think more in advance.

KHN: Okay. So, when you're making a piece do you think of specific actions you need to take before you start making it, or does that work another way for you?

HK: Yeah, okay so, definitely, yeah, I ... before I ... So, I think of something and before I actually start working on it, I definitely think through how I, or what I need to do beforehand. Cos, for example, if you like a box and you build it and you seal it and, actually there should go a ball inside of it, then of course you have to take everything apart again and put the ball in and then close it.

It would make way more sense to first have all the sides ready and then you put the ball in and then you close it and then you are finished. But, so yeah, when I start to work on a piece I definitely think beforehand what I need for it and how I approach it. Also, I really don't like to go to the hardware store or whatever store for 20 times because then, okay, now I need to paint, and then I need the concrete, and then I need maybe a string or something.

So, I make lists and like a shopping list, or also a, yeah a material list, or also a step by step list, what I need. Maybe when if it's a bigger thing, then I maybe just don't have the space to get everything right away. So, I most definitely like think from step 1 to step 20 if that's the end.

Sometimes it happens that something doesn't work out the way I thought it would, then I have to adjust definitely. Also, but I think through hit beforehand.

KHN: Okay. Thank you. So, yeah, can you list at least five more if you feel like it, verbs or adjectives that are important to the way you interact with, or manipulate materials?

HK: Okay. So, for the material itself, I like if the material is dirty, or also if I get dirty by working with it. And if the material is kind of fragile. So, I also need to be specific with it, or yeah, not just have a brick and hammer it, but really somehow I have a challenge by working with it.

And maybe when I think about me working with things, I like it exhausting for me. I like if I really, if it's like kind of exhausting to work with it, and its, yeah not so easy to do the things. Cos I sometimes have this, yeah, can everybody just do it. No, I wanna make something special or something different.

And, but I'm also impatient concerning myself. So, my impatient would also be an adjective that would describe myself during the process. But I don't like it actually, it's just a fact.

And I'll try to think of a very that would also fit in this. [long pause] Touching I guess. Or to touch. I, that's I think why I don't like to paint or draw, because it's so two dimensional. And, when I work on a sculpture I can ... it's a form, its it has a body or something like that.

Also, when I work with video or photography, there is something that I take the photo or the video of, which is also like three dimensional or has depth. Yeah, I guess that's quite okay.

Maybe also, uneindeutig is a German word for not clear on first sight, or not ... what would be a better translation. Not easily understandable on the first glance. But maybe with, yeah with more depth. I hate the pth, depth. Uneindeutig.

KHN: [long pause] Great. [long pause]. What do you feel like is the most important skill for someone, who is starting learning the materials you work with, to learn in terms of like physically interactive with the material?

HK: Physically ah. When you said the first part of the sentence, I just thought of patience and having the, yeah, just the will, or the energy to try things out. So, to experiment with things and see what works best for the thing that you thought about. But physically, I would say, [long pause] ... Its funny whenever I think, I just have the picture in my head first of a situation and then its hard to find a word for it.

So, maybe, Filigranität. Is this English translatable. To be filigran. So, like the opposite of brachial. So, not being like ... [hand motions] ... dammit. Not being so clum ... the opposite of clumsy. Like to be like ...

KHN: Graceful?

HK: Maybe graceful with it, yeah. To kind of respect the material to approach it with maybe logic and mathematics. Like when you mix the powder of plaster and water, then its just a 50/50 thing usually. But sometimes, you know, it varies. And with concrete even more complex, because you use three compounds, or if you wanna put something into the concrete you need more.

So, just yeah, you be slower with it. Yeah, and patiently slow and try things out and not force things. So, the opposite of forceful. So, graceful I guess, is a good word.

KHN: In the materials you work with, can you change or reverse when you make a modification?

HK: Reverse? Not. Now because I work quite a lot with concrete and plaster, reverse is very hard. You have to just start all over again. But you can make adaptations by ... dammit ... [German]. Rubbing it.

KHN: Like sanding it?

HK: Sanding it, yeah. Exactly. You can adapt it, but not reverse it. I guess also, if you draw things, you're not ... you cannot really reverse your [pause] ... your line even you were to rub it away, but because you still have to print I guess. So, I guess for a perfect, whatever perfect is, but a result that doesn't show your mistakes, I guess starting over would be the best method. [long pause].

KHN: Okay. I think we're ready to start with the second part.

HK: Okay. That is I work with it.

KHN: Yeah.

HK: Alright.

KHN: Yeah. Okay.

HK: ...Put on gloves, because working with concrete is chemically just a bit dangerous and, yeah skin gets hurt. And, wear also some air protection because it, you will see that will dust a little bit in the air.

But for now, first I have to put some Vaseline ... how to pronounce it.

KHN: Yeah.

HK: Vas-e-line [ph Vaseline]. (laughter).

KHN: No, it's Vaseline.

HK: Vaseline in the form that I will put the liquid concrete in when I'm done mixing. And I put Vaseline in because when I take the product in the end it will just be easier and smoother to take it out again. That works actually with everything very well, also with plaster. It's just grease kind of. It's very good. Yeah, not so stick to the form, to the negative.

[long pause] Okay. Let me clean them. So, now I clean my hands. Because its sticky. Just shut the Vaseline box. I had put on the mouth protection and the nose protection. I could also use glasses, but I mean, I ... I mean, I'm young, I don't think about that stuff, that...

The first time I made this, and I didn't, it was very sticky, I went in with my hand and afterwards, I had fingers, or my hand, my palm was like when you were in a bath for an hour. Because it took out all my liquids I guess. So, it felt very awful.

So, since then I did some research on concrete and I learnt, oh it's not that healthy. And because I did it a couple of times I don't have to measure it all the time anymore. I just do it by eyesight and approximately. And you have to mix the cement with ... so, you take one part cement and three to four parts of sand. And to mix it, so I start with the cement. And I guess this is the, yeah, not so healthy part.

KHN: What are you doing with the cement powder there?

HK: Oh, I sorry. I ... so I, cos it's my last part of the series, it's the rest of my supplies. And coming back to the question you asked before, I thought first how much I would need for all of the parts. So, in the end it turns out to be an empty package of cement. And I did five already. Yeah, I think so. One, two, three, five, and this is the sixth one. And the 5 kilos approximately work for those five, six concrete bases for the signs I made.

And then I mix in also, in from the bag from the ... a hardware store, I put in the sand. And this is the very thin sand. So, to have a more stable structure, I also need to mix it with some harder, or bigger sand parts. It just fixes the concrete better together. So, you can have bigger sculpture or bigger objects. The bigger your stone parts are the better the cement works together with the water to like, fix it together and make like a net of it that isn't loose.

And I fill in with the sand again, and I use it up. Its approximately three to four parts in the end. Okay, so that's enough. And now I have all the dry components together and I just mix it and I have a cooking spoon because it's the cheapest form of mixer. And it's just easy to handle. And yeah.

KHN: So, right now you're mixing all of the ...

HK: Oh yeah, now I'm mixing all the parts together until, because if you see the sand and the stones have an actually a very smooth texture, but the cement is a bit flowery really, maybe yeah, it sticks more with itself. So, I just to try to mix it, maybe for now with this part of the other side of the handle. And I just mix it like cooking. I mix all the dry ingredients first and so, they do build a dry balls within themselves when I add the water later. So, it's easier if this is like really well mixed.

I mean for such a small, well this is still rather a small thing, it's not such a hard work and you don't need to be super, super detailed about it. But as long as it's not too hard to get it, mix it a little bit, it's fine to just take a couple of minutes to do that.

And when it all has a smooth texture as it has right now I think, I'm thinking of adding water on. So, I think right now, I had like, maybe this size of cement and three to four times more of that size and sand and tiny stones. And now I'm gonna take maybe double the size in the water.

But the thing with cement, me in my experiments was that it's you add water and its dry, its dry, its dry silver and sandy. And I think okay, I'm just gonna add the same amount of water as I did in the first place, but then it's way too liquid. And then adding cement and sand again, it's quite a pain in the ass. And also since I don't have any more left, I'm gonna be very, yeah, very, how do you say, yeah so about adding the water. Just bit by bit.

So, now I'm adding the water maybe like as much as I had cement already. And on top the water is still up there and in the sand part it slowly sinks in. But it's still very, very sandy and its definitely not enough. It's very clumpy, or clumpy can you say that like?

KHN: Yeah, you can say that.

HK: Like bits and pieces and it's not a smooth, smooth texture. So, I'm gonna add some more water, maybe yeah, just half a glass full. And I'm mixing it again just like you would when baking for, yeah, for some cake or something. And it's still not enough, but I don't need much more, just a little bit. And I just added some more water. And now I see this part already has a nice smooth texture. It is a bit liquid, but still sticky.

This will be good when dried, but I still have a lot more of not mixed in sand left. So, I need some more. So, I guess this that I have already would be good to maybe make some home improvements, fixing some holes in the wall or something, or on the street, sidewalk, or something or whatever, wherever you need concrete, I don't know. This is also already okay, but not liquid enough. Its near to still, yeah, too dry. A little bit more. I'm mixing again, I added a little bit more water. So, now I have like maybe one and half times as much as I had cement of water.

I might already use the mixture that I have right now. But you can also test when you shake it how wobbly it is. This is actually already quite a good mixture. I'm a bit scared, but I might, let me see. I might add a little bit more water. Just a little bit. Like okay, that's I think more than enough. But it's also okay, if it's a little bit too much it usually comes up to the top and just evaporates.. and then, this is also quite nice. But the water just yeah, comes up and evaporates.

I like this actually. It's nice and smooth and I can mix it and its yeah, it's kind of, it moves when I shake it, so it's kind of liquidy [ph]. It's definitely enough for me. So, now I am done with the mixing and will it pour it to the bowl than I put the Vaseline in first. And yeah, now I'm doing that. And I'm shaking it out a little bit and falls into this bowl that I put the Vaseline in first. And cos it's still a bit sticky, I'm using the spoon to put in the rest.

Its... I do have to admit that my calculations didn't work out perfectly for my six concrete, yeah, stühls. But it's still good enough. I mean probably they will stand there for not a long time, so I don't have to be like super anal about it.

And now I shake it, I shake the bowl where my liquid concrete is in because I want the air bubbles to come out, because air bubbles disturb the concrete to bind together. So, the ... yeah, it won't be as stable if there are a lot of air bubbles in there. So, I just bump a little bit on the floor. And now I put the finger in because there was a not well mixed part there and now it's fine. And I shake it, or I bump it on the floor again and you see also the very liquid part or the water a little bit comes to the top and the heavier parts go down. So, I think actually stop now this is fine enough.

And now I move to the place where I put in the stick or like I put in the sign. So, this is here. This might be tricky to film. Okay, this is my favourite trick. I need to... I actually don't need the gloves anymore, so I take off the gloves because I won't touch any of the concrete anymore.

I'm just gonna move the chair so you see better.

KHN: Thank you.

HK: So, I'll put it here because I have the string attached here. And this is because when I take my sign and I just put it in like this it might fall. So to have a steady and straight position, I will tow it to the rope here. And now I want to place the stick in the middle of my concrete. And you see it's actually not enough because it doesn't get to the middle stick here. So, the middle stick is whatever, I need it without any reason. But it's okay, I think it will stick anyways.

I have just to adjust the rope now to the sign. And turn it around there for two or three times. And one more cos I want it to be a little bit up in the air. Up see. Now one more. Okay. Oh yeah it fits now. No, that was too much. One less. Okay. This should actually ... what happened here. Okay. Yeah, now it's fine. And I will just let it ... It's okay if it's a little bit tilted. But I wanna have it ... Oh see. Ah wait.

That's always when you show somebody the effect. So, that's actually quite good. It's quite straight. And this, like I might have to move it on this side a little bit. And it's still tilted a little bit. And so I just pushed it on the ground a little bit to have approximately a straight position of the stick of the sign.

And now, I just have to wait for ... usually I just wait for a whole week before I take it out of the form. But I think you could take it out earlier, but I just want to be sure that it's hard and fixed and connected to the stick as well. So, I'm just gonna leave it like this. With this I might, because the other ones you see, vary in height. I might maybe have to add another layer if I feel like when I take it it's too wobbly and too shaky.

But for now, cos I don't have any material left which is fine, I just have to wait and see. Maybe I overdid it there and a stoop like this is ... what is it, stoop? Like in soccer, how do you call it stander?

KHN: Yeah, like a stand or weight.

HK: Okay, or a weight.

KHN: Yeah.

HK: Yeah, so the stander is maybe fine and not like this also. And now I would just clean up.

KHN: What's important with the string that you're having hold the ... Can you describe your process for figuring out like how high to put it in or?

HK: Oh yeah, I just put it as high. So, the string is for the balance of the stick. So, because generally, or because of *Schwerkraft*, the Earth weight.

KHN: Gravity.

HK: Gravity yeah. Thanks.

KHN: Yeah.

HK: Because gravity generally, everything that you know is on a strong somehow comes to an even place. And so, that was just the idea to have a simple way to have it hold. My first ...

[interruption by male speaker – Hi.]

HK: Hi. My first experiments were just to lean it next to something but then, I had the bowl on the ground, so that was in the way. The second one was tape it somewhere, but the third idea was to just use a simple string. And I used the length of just the sign and a little bit longer so I could adjust it if something was not accurate enough.

Yeah, and since its still liquid I can still adjust everything without destroying anything.

KHN: Great.

HK: Yeah.

KHN: Okay.

HK: One more thing.

KHN: Yeah. Sure.

HK: Okay, so the only thing I might wanna add is generally, when I do art, it doesn't matter if its sculptures, installations, video, photography or performances, why I do it is a mixture, a combination of expression myself and things that bother or that I find beautiful or not so beautiful or great or not so great and general troubles I have with society.

And my works are somehow related to, in a way that I want to maybe educate people, or just educate in the ways that I think and look on the world to open up minds. And in the end maybe create a better world, or maybe a more open minded and accepting world. Yeah, that's all actually.

KHN: That's great. Oh, I have one other question for you.

HK: Sure.

KHN: Do you teach at all?

HK: No, I don't teach.

KHN: Okay. Good to know.

HK: Sure.

KHN: Thank you.

HK: Sure, thanks also.

Interview with Sadie Lune

19 April 2017, in her studio, Altes Finanzamt Neukölln, Berlin, Germany

KHN: Alright, are you ready?

SL: Mhm.

KHN: So if you could start by briefly describing your practice in terms of process, materials, things like that.

SL: It's very diverse I would say, because I work in a lot of different media and it depends what medium I'm working in. For visual art, I would say that most of practice in any media is not so much what I would like, which is like a regular standalone routine for its own sake, but more like a la carte per order thing. Meaning that I'm making pieces more for a specific end, usually an event, rather than just I have a regular routine, a daily practice or whatever, like a practice I'm engaging in and then there's a show or something like that and I take from what I've already been doing... So. I think a lot of my practice is kind of deadline-focused, which is super stressful.

KHN: I can imagine.

SL: I mean I've had a dream for at least ten years of like, the thing where I have a space, and now I have a space which is great, but this has only been two years that I've had an external space to do artwork, like out of my home or whatever. Where I have a space and I just have like, hours I go there every day or four times a week or whatever and I just work on what I'm working on. And then exhibition is the secondary thing I'm working on, like oh I want to do a series blah blah blah, and then I look for a place to show it or something like that. But in this case, and I think it's a lot because I spent so many years focused on performance-based work. It's really like most of my art is per order, so when there's a thing to have it be shown, then I make stuff for that thing.

KHN: Can you describe your performance work, for example?

SL: Yeah. I mostly do solo performances, but sometimes I do work with collaborators, usually one collaborator but occasionally I've done groups, and I mean, it's changed a lot. I don't do performance work the way I used to anymore. How that used to be was more like.... Either longer kind of atmospheric pieces, meaning that I would be in a space where something else was going on, like either, I don't know, a show or a vernissage or like a party at a nightclub whatever whatever, and I would be kind of doing a piece that was for several hours, often interactive. A lot of my performance work is interactive. But it wasn't like, here's a show, I'm up on a stage, there's a beginning, middle, and end and it's done. A lot of my performance work works with ritual and that and kind of ritualized framing. Most of it is about sexuality or intimacy, gender and shame. And a lot of it has been silent, although sometimes, I talk, and when I talk, it's kind of like... occasionally I have a text for performances, but generally it's like either I do silent not dance but kind of movement-based, ritual things, or I talk in

more of like a conversational tone. But with my own work it, and maybe also part of the fact that I don't speak a lot in my own performances is because the places that I had to do it was like a nightclub or a bar or a... you know? Something where there's... It's not really conducive to, it's not like a theatre where people go to...

KHN: ...Would be listening to what you're...?

SL: Yeah. And I think also just because I get stuck sometimes on words; even though I'm a really big talker in life, creating a text for performance feels somehow... feels scary to me, so often I'd rather just show. But it's very very often interactive with the audience. Sometimes there involves, like fluid exchange, like I did different things with breast milk for the time that I was lactating. So like I did a milk bar, I also did a performance where at the end of it I put milk into like little shot glasses and handed it out to the audience...

KHN: Oh, yeah, I was there for that.

SL: Oh cool! And um, yeah I guess a lot of it is about kind of... finding a concept, and a lot of it's about symbolism. Symbolism of the props that I use, or the way that I have a costume or present myself, and then finding a concept and then kind of like enacting that within the frame of a ritual or something kind of ritualistic like that. But there's always variations as well.

KHN: And then what kind of visual artwork do you make?

SL: Visual artwork! I do oil and acrylic painting, I draw comics and I do linoleum cut prints. Is there something else? I think that's mostly it. There's also... When I say 'I do', it's more like 'I've done', because my performance art work really took over most, and I honestly think it's because of deadline, with performance it tends to be like you get booked for your performance and then you have to make your performance, like the performance has to happen because there's an audience and an event and whatever, and when you're used to working with that kind of stress on demand function, it's hard to make space for the more day by day meditative practice of doing visual work, at least for me. But I think I'm trying to move back into that, because last year I did a performance with my two co-parents that was a bigger piece and it was pretty rewarding, and really good to do, but I think in performance I need now a bit of like bigger deeper pieces and collaboration, which I didn't used to, and I'm really looking forward more to the kind of like... lack of build-up and stress around creating visual art, where it's like getting into the zone. As far as the actual making of something goes, and I miss that, and think that's what I need more in my life right now.

KHN: In what ways does your work involve manipulating or working with materials?

SL: Well. Yeah, it depends what media I'm working in. For linoleum cuts, I have to carve, like I carve, draw on and then I carve a sheet of linoleum, I have a chisel and I take long shreds of linoleum out. And then, I have this block and I roll on ink and then I print it. So that's a lot of different physical manipulation of materials.

KHN: Does the printing require pressure or?

SL: Yeah yeah definitely. And actually, one thing that has been advised to me that I've never done... like if you're doing linoleum prints on like a professional level, you have a press so that the pressure is firm and even, and I've never done that. So I actually do it where I put the paper on, press it with my hand as much as possible, and then I have something heavy which usually has kind of a rounded bottom, like a jar that's full of something for instance, and then I like in circles tend to rub rub rub rub, and then more with my hand, but it's actually very physical, and very... It like, making the linoleum is the first part, it's a very discrete part from making the prints. And the prints are way more experimental because of the pressure, actually. Like is like, is the ink the right layer and thickness on the block, and how even can you make the pressure. Whereas the chiselling is also a bit hit or miss because you can always slip and make a mistake and when you make a mistake it's done, it's not like painting where you can paint over and it's like invisible, it's either you make a mistake and the piece is fucked or you're working with the mistake as a part, so that's kind of... the stressful part, but also the carving is very... like besides the act of slipping, the carving is very much regular, whereas the printing is like... at least for me, I don't know what's going to come about, and which prints will work better and what I'll like, and a lot of that is about the pressure. And I also tend to put the paper on top of the board and press from the paper, instead of pressing down from the board, because the pressure is better if it's not going through the thickness of the board.

KHN: Yeah, so you press the paper from above.

SL: Yeah and it's like ... and then you like, mixing from going up and down to a lot of circles with both my hand and something heavy. A lot of attention to the corners, because that often solidifies the piece, like if the corners are well-printed, variations in the middle are easier to... yeah.

KHN: I guess you touched on another question I had about the fact that when you make a mistake you can't change it, and I guess, with working with something like this that's a little different than with performance, where you can...

SL: Yeah, so with performance if you make a mistake, if I make a mistake, I improv around it in that moment, and the other thing is that in performance, a lot of the way I do a performance or I formulate it is... it's interesting because I feel like the 'right way' to do the performance I do is to start with a buddy and kind of maybe have the props that you want to use and play around and experiment making images and moving and stuff like that, and that's not what I do. It's all intellectual, I like imagine out a thing and it's very much thinking-based. I think part of that is that before being at Altes (art space) I just didn't have rehearsal space, but I think I also have a thing where I'm not a dancer and I've never been a dancer, so being alone, experimenting with movement is... feels very hardcore to me. I come to a lot of like vulnerability and shame and frustration with myself when I'm doing things like that. So for me it comes to like, be more of an intellectual process where it's me thinking and making notes and having new ideas and imagining it, and so what that means is that often with my

performances I'll have like a general arc of how I want the performance goes, and then I'm blocking like action to action, and then the actual, the in between parts are how it all moves together is not like choreographed. It's like there's room for some improv and there's this and there's... and what that means is if I make a mistake I might get really thrown off and disoriented and feeling lost or confused within my own piece and also mad at myself or whatever. BUT, probably it's pretty often that the audience would have no idea because, unless I just stop and have a look of terror on my face..

KHN: But then maybe that's part of the piece too.

SL: Mmm, yeah because it's like, it's not like, like I have this framework in my head, I know I need to go from here to here to here to here and this is how it closes, but it's like a series of actions and gestures using a series of props and costume, and it's... while I feel like it fits a narrative structure in my head, because there's this like narrative arc, it's not literal enough to where I feel like people would be like 'Wait what?' because it's all kind of like 'wait what'. So if I make a mistake or I forget something or whatever I think it's more about me and if I can recover in the moment with an improvisation that I still feel committed to or whatever, than it being clear in the outcome, like the perception of the work. Whereas with this, if I cut a big line through my thing, it's like I either decide that my thing is going to have a bunch of lines through it and that'll be the new style, or it just looks crazy. It looks like a slipped and cut a big line through it. I guess that's how I imagine it.

Oh and, manipulating materials, so when I do performance work a lot of it is body and a wide variety of different objects. But I tend to use... like there are certain objects that I tend to use again and again and again, like my symbolic vocabulary, and I think that one of the things that is not as great about my thing about thinking through everything rather than trying things is there are certain things which seem really simple but which, when you're working with them, work completely differently than you're imagining them to. Like blowing up a balloon. Like they're very simple physical things that you've done a million times in your life, but when you want it to go, when you have a particular structure in mind of how to interact performatively with things, it's like, my brain does not furnish all of the detail that actually happens when I'm doing that to get to where I need to go. I can remember one performance I did years ago and part of it I blew up a condom that had glitter in it, it makes like a big glittery condom balloon... So yeah, I had it like in my... bra? But I wasn't wearing... anyway, I had it on a little place: I like to make things I think of as altars, so my props in kind of an altar configuration for me, I'm not sure if that's read by anyone else that way.

And I had it, and I was in the performance that I think... I've done blowing up condoms plenty of times before in my life, and I've also done it with glitter in it in a different performance years before, but I hadn't rehearsed that action. The thing that I forgot is that I was using a lubricated condom, and in the moment it was slipping and I couldn't get my lips firmly around it to blow. But then, I'm already doing, I've already done... This is the mistake performance where the audience can tell, because if you're already doing an action that's clear that there's an endpoint or a goal to the action, unless you

make it a repetitive loop of failure, which yeah, is a good save, you gotta pull it off. I couldn't blow up that goddamn condom, but luckily I had a second one prepped. Eventually I just gave up on the first one and went to the second one, and the second one worked. That's an obvious mistake for example, in performance, that because of the arc or because of the interaction with the prop I couldn't get around..

The thing is that a lot of my work for the past ten years has had things with eggs inside of my vagina and usually that's pretty... Well, there's one thing that I like about it which is that it's pretty predictable the way that the egg comes out. How much effort and how long it takes varies a lot. One time I was doing a performance where it was simple but it was based on the egg in my cunt, and could not get that egg out. I've done this plenty of times, it's not like it'd really get stuck, but in this particular moment it took FOREVER, and then I had to work with that, also being stressed out like what if it doesn't come out! That's the whole thing I'm doing! I guess there's a lot of room for surprise in that way that I do performance, and especially in the ways that I manipulate my body or the props that I'm using.

KHN: Yeah..

SL: Like even a cervical show and tell, I don't poke at my cervix generally before I do a show and tell, just to be like... [laughs]... Though sometimes I'm surprised, usually I've gotten quite good at placing it in the right place with the speculum pretty fast and getting it in the right place, but sometimes I have to dig around, and then the audience has to watch me dig around and get increasingly uncomfortable. Usually because I think for many people it's intense to see someone stick a speculum inside themselves and open themselves up and invite people like yeah, come look! But then if they perceive that there's a relationship to physical discomfort, that it's not going easily or whatever, I think it can really freak people out. Or sometimes my cervix looks weird where I'm like huh, okay, this is what's going on now. Yeah, there's a lot of body manipulation things like that and interacting with objects in performance.

KHN: I feel like you partially answered this, but just to clarify, when you're working on a piece do you conceive of it as a finished work before you start working or do you approach that process more intuitively?

SL: I would say half way. I would say that for instance, a painting or a linocut, I have my basic main thing that I'm representing when I start for the most part, and then as I'm painting I get more ideas, and little things come out of the woodwork and I'm like, oh yeah, that's how it should be, that's how it should be. And then I add in that in the process, and with performance I think it's kind of that way too. I know a bunch of the points I want to hit, and then it's very based on thinking. I think I have a very intellectual process, like my approach to work in general, I often wish that I could just relax and let it be more physical but that's just the way I.. I tend to think and make notes, think and make notes. Even for visual things, I tend to make notes of like, oh yeah, I want a dinosaur, and then don't forget the whatever. Then I'll kind of create a score in my head... What was the question? Sorry.

KHN: Whether you come to a fixed idea or...

SL: Ah right. So then I kind of create a score, and depending upon what is available for the rest of the process, like is there time and resources for rehearsal, is that me in my room, is there a space where it's going to be done, etcetera etcetera. Then it varies how set the whole thing, talking about performance now, is before I perform it. But there is generally always some space. I tend to work with a strong frame or skeleton with space in between, and that's probably true for most of my work. But I don't usually dive into things just being open to whatever. I'm too thinky to deal with just following the muse or whatever. Even when I paint things and I work on the painting for awhile, I tend to make notes and think oh yeah, this color thing or whatever. I work a lot with notes and lists, in all of my creative endeavours, writing also.

KHN: Can you think about and list five verbs or adjectives, like describing words not things, that relate to your practice in terms of action?

SL: Stress... interpretation or interpreting... insecure... but then what's the other part, the middle part... flow, I guess. That's not a verb, I'm not using any verbs, those are all nouns. Sorry.

KHN: I mean you could make... Interpreting is a verb. In terms of the way you interact with objects.

SL: Hard, or pressure. Even when I draw, I press hard. It's a lot about pressing hard, like harder than I even think is good. I feel like there's a lot of back and forth between improvisational things and very fixed things, like the way that things are supposed to be or the way that I'm supposed to work from what I've learned or what I think is true or whatever, and then some kind of more open, playful experimentation. Some sort of weird constant back and forth between improvisation and.. But one thing that, that isn't a good answer to this question, but in performance, and in all of my work, I have a strong internal sense of how things have to be and are supposed to be. It always takes a while to realize that I'm the one who makes up those rules and they're pretty arbitrary, but when I start to make a piece, I pretty much start with this feeling of, I don't know, limitation? Or some sort of specific obligation that needs to be fulfilled through making that thing. So I think that I have a lot of like internal conflict of feeling like I'm fulfilling whatever the ideas are of how it's supposed to go, whether that means entertaining an audience versus like doing an action that I find interesting or how I'm supposed to be working with my materials or how I'm supposed to whatever whatever versus having space enough to try whatever feels interesting enough. I have a lot of conflict with that, and it's probably part of why I stopped doing solo performances so much.

Yeah, working with materials, there's a lot of hard pressure. There's also a definite sense of especially when I'm working on visual things with my hands, that feels really good to me, satisfying or like a sense of fulfilment to me or something like that. But I never get to the point where I feel like I'm super skilful at the media I'm using. There's a lot of relearning.

KHN: Okay, so do you want to start [the manipulation portion]?

SL: Sure.

KHN: So can you describe the actions you're taking?

SL: So first I'm figuring out what I want to work on, and since I haven't worked on this piece in awhile, I'm working on more outlines, more bigger line details, because just getting used to using the chisel again and how much pressure... a lot about the chisel is about pressure per different chisel head, per line, so just getting used to it, it's easier if for instance, a long line, like this is easier to make, especially when you're in the flow of it, is more satisfying than here on the feet when you want to make all these little cutouts. I don't want to start with that because it's too.. I already have to be a little bit in the flow of working with the material to like get that right.

Also the other thing with linocut is that the image always comes out backwards and reversed as far as what you're cutting away is what's not going to have ink on it, so I have to look at my drawing and remember what everything means. Remember which parts of it are going to be ink and which without ink and how they work together and make sure I'm cutting the right lines and not the opposite ones. And places like this where there's... basically everything that's drawn on, I mean the colours are arbitrary but everything that's drawn on will have ink and everything else will not. But places like this with the feet and all the book and stuff it gets kind of complicated. Where I have to look and make sure I know what I'm doing.

KHN: So you're removing material?

SL: Yeah, I'm cutting out and digging out the linoleum. One thing I like about linocut is that you actually get this big pile of trash, at the end you get all of these strips, and some are really long, and somehow that is satisfying to me, I feel like I've really done something. I think that's another thing about performance, especially because I tend to make new performances all the time instead of doing the same handful over and over. I have a handful that I do like that, but normally I make a new one per event, and especially because most of my process is in my mind instead of in action, it's hard to feel like I'm doing anything. So it's nice to see a visual artifact of okay, this was like this before, now there's less, and it's very clear. Same with painting, that's satisfying, okay you spent three hours, it's clear.

KHN: You can see some evidence.

SL: Exactly.

KHN: Is it confusing to remember which parts you're trying to cut away?

SL: Yeah, there's certain parts where I'm like I can't, it's not clear to me how it's going to work out. Also when you draw, there's a certain level of detail that that doesn't well translate into the carving because the ink spreads in a little bit different way, it's not as precise. So I tend to make things which

some parts are very detailed and some parts aren't, but whether that actually works right as a print is very .. so sometimes I draw a thing a certain way, and then I'll, as I'm carving it, I'm determining, okay, is this too detailed, and I'll kind of like reform it so it'll work out better in printing. Deciding what the image should be and then reworking it, like reinterpreting it step by step, like how well will that work, and is there another way that gets the impression without the original way that I drew it.

KHN: How does your hand feel when you do the motion of removing the linoleum?

SL: It feels good but it can hurt my wrists after a while, but this is true of most things I do with my hands because I have wrist problems. And because I press fucking hard. I realize when I'm drawing and when I see people drawing that I don't need to make the drawing into the table. But this is how my body... I don't know, I have a lot of pressure to give. Sometimes I specifically think about that while I'm working, like if I'm pressing really hard I'll try to lighten it up a bit, but it's also nice. it's a very satisfying feeling. Another medium I forgot to mention that I work in is crochet, this is again the hand-based medium and I do a lot of... I don't know how to do, I've never crocheted with a pattern, so it's this very improvisational.. the way that I crochet. But it's really fun to have this thing where I have this image in my head and then I'm like, like the part where I never feel super skilled or very very specific or exactly professional is also kind of fun, because it's like I have this image in my head, and I'm like, okay hands! Give it a shot! You know? And then it's like figuring out in a bunch of ways.. like it always feels a little experimental. But that's fun.

KHN: Is there a reason you chose that chisel tip versus another one?

SL: Yeah, it's about the thickness. So these sets come with five different tips... and also the very thinnest ones are often actually quite hard to work with. And are they the ones that slip the most? Maybe. I think that it might be true that the thinnest tips, like this one I think is a one, that's the one where it's easy to jump and then you have a big line somewhere else that you don't need to do. So yeah, when I'm starting a session I would prefer to start with a bigger one, that is a bit smoother, I have more room to like... I'm taking longer strokes, etcetera etcetera and then as I get more into it I can move to the smaller ones and then.... Yeah. But I'm also a person where I think I'm very lazy with materials. Like if I'm doing a painting, I could totally do the whole painting with the same paintbrush, the whole time. That would be... it wouldn't serve well for mixing it up and having a spectrum of different angles and sizes and stuff, but ... and I think in oil painting it's a little easier for me to have my kit and remember whatever. But I tend to be a person that when I start working, it's a little harder to switch materials than someone who's constantly... if there was one tip that did it all, I would just use that.

KHN: Yeah, it seems like having the different tips means that you have to make certain kinds of decisions before starting [the linocut].

SL: I think that's maybe also part of how I ... the thing about the deciding while drawing and then reinterpreting while carding what that's going to be like ... Like I didn't draw... this is actually kind of

the opposite of what I'm saying, but I didn't draw these around the cheeks or whatever. That comes in in carving and I'll decide to leave this, even though in the drawing it's flat, it's blank, because it gives it texture and that's a nice thing about this material, you can get these little mini-textures just through leaving a little bit of the linoleum that could be carved away and I like that effect. But parts down here where there's like the curve of the claw and lines of the or on the claw, and then there's lines on the book and then there's background and I'm not even sure what's happening here. Like that I'm going to have to interpret into carving as far as what do I think will read while I do it, that also means that I would start more with the outline of the whole shape, like a thicker one like this one that goes under here, focus more on big pieces first and see how it comes out and how it's going to be read and then stop. It's possible I could end up leaving these claws more solid than they are because it just doesn't seem like it'll read.

But yeah, it doesn't really pay, at least not at my skill level and with the materials that I have, it doesn't really pay to have super super detailed drawings, because I just can't, they're not going to come out like that. And oftentimes, faces, it's crazy that I like to do faces in linoleum because for instance, it's totally possible that when I print this, like this whole eye is just all ink, none of it reads. And sometimes I'll go back and re-carve little pieces after I've started printing just to see what actually works, and sometimes I'll just kind of like, change my idea of what it's supposed to look like. I started thinking recently about maybe just exhibiting the blocks themselves rather than focusing on the prints, because I actually really like the sculptural bah relief texture of it, of the linoleum, and I guess it feels a little more under my control. I think that's the other thing about the hands, the pressing is what hurts, like when I'm making the print, I'm really hard hard hard hard pressure, it's like I massage every print. And then I'll take a [coffee mug] not with liquid obviously, and just [mimes pressing in circles]. Obviously very DIY, I think there's like, official heavy metal.. like a thing with a heavy metal ball on the end ... but I don't have that shit, I missed that class in high school.

It's also interesting, this thing about, with painting I feel like it's all about moving your hand and the brush, but sometimes you move the chisel and sometimes you move the linoleum. Yeah, it's like constantly editing. I draw, and that's the first edit, and then I carve, and that's the second edit, and then the printing is the final edit. Each part of it comes out with a different result. I miss ... in performance I miss the rehearsal with other people as a practice. I miss that. I used to perform in plays a lot, so I love feeling like you're going over and someone's watching and having notes and you're having ideas and then you do it again, and it's very hard for me to do all on my own. To rehearse in what feels like a proper way, in a way that feels like it gives value to the piece, but I really miss doing that with other people because I like the feeling of creatively trying for something and getting it a bit better and getting it a bit better and getting input from other places and then... I would like to be performing, like now if I'm going to perform now I've decided that I need, like it needs to be mostly in a theatre with like a light setup and also with people who are ready to, who are there specifically to see a performance, rather than a performance is happening incidentally to what the main point is of the event people are

there for. I want to be able to rehearse within the space. That's the other thing, so much of my performance work is made with zero lights and zero sound or projection just because I perform in such a variety of venues with different resources available that I just decided that it's... that I should just make it as low tech as possible so that it's more flexible for what is realistic in any space but I'm tired of that, I feel like it's limiting and I want to be able to work with other people and work with more technical resources that are going to be available and functional. Kind of reliably.

KHN: It almost reminds me of peeling vegetables.

SL: Mhm.

KHN: But in this sense you're peeling it to create texture.

SL: And also when you're peeling vegetables the idea is to get all of the peel off, not in any specific formation, and I think some people peel with short strokes and some people do longer. To me this is like, depending on the... one thing I do is... So I color it in to show me where the ink is going to be, but of course when I start carving sometimes it's hard to see exactly what is what. So I might color it over again to see what the real lines that are coming out are. And sometimes I leave parts of it, but sometimes I make different decisions after drawing on it.

...This one... is too regular...

[khn_0615.mov: 4:30 – 6:30 have interesting carving actions]

So I'm going to switch [chisel heads]. This has a thinner...

KHN: Do you teach at all?

SL: Teach?

KHN: Yeah.

SL: I've given some workshops in performance technique, but not often.

KHN: And what age group was that for?

SL: One time I did it for teenagers, that was weird though and I don't think I did a good job. No, I think most of my teaching is around BDSM or sexuality, not around art-making. I sometimes give people specific ... something kind of like tutoring or something? But very rarely and pretty randomly. Like someone's like, 'I want to start practicing drawing, do you have some way to help' and then there's also the fundamentals of drawing that I've completely forgotten and I'm always like wait, what about shading again?

KHN: What's your background in terms of art education?

SL: I went to a high school that had a pretty good art program, and I was involved in visual and, visual art and theater and writing, and not just for whatever requirements for extracurricular a lot, like that was my main thing was in those fields. And then, I went to a bunch of different colleges... At one

college I learned how to make video, that's a media I totally just forgot about. Video, which is really hilarious because I'm super non-technical and I edit my own videos and I fight with my computer all the time. It's really not an intuitive way for me to work, but I think I have a strong intuition for image creating and the pace of video making, and it just sucks for me that digital interface is how you make that happen. You know what I mean? So it's like this funny thing where I feel pretty strong and good about my ability, the timing and the choices and all of that, and how to put together visual imagery and sound and things like that. I feel pretty good about that with video making. But the actual technical interface, I'm an idiot, and it's a big struggle and a funny thing. It also means that footage, proper lighting for camera to make a specific image a certain way is beyond my abilities. So I work in a way that I know that, and I'll use for example natural light because it appeals to my aesthetics without having to know exactly what I'm doing camera wise. In some of my videos I hold the camera while I'm performing, which is interesting, like having sex holding the camera on the sex that I'm having at the same time. My video Egg is like that, for instance. What were we talking about? I started talking about videos.

KHN: Yeah, I was talking about teaching.

SL: Ah yeah.

KHN: Do you feel like there was a skill that was really important for you to learn as a student, or that's important when you teach?

SL: Well this is directly out of high school. So, and that's the funny thing, whenever I talk about my printmaking people are like, 'Oh yeah I did that in high school' and I'm like, yeah well me too, I just kept doing it more. Yeah exactly. And then, in college I learned to do, that's where I made my first short film and learned about video-making and just as someone who feels pretty uncomfortable with technology and not very good at it, that I could use that medium was through a class in college. But I would say that most of my art education is not formal and is through basics foundations of middle school and high school where I learned the fundamentals of drawing the fundamentals of... But then I worked as an art model for colleges for a number of years, so certain things I picked up from there. Basically I feel like I got the basics of most of the stuff I do in middle school and high school and then I've never had that much formal training on top of that. I've just been somewhat autodidactic. I did take a really good performance intensive one time, that really I feel like strengthened my performance work with La Pocha Nostra and Guillermo Gomez Peña and that was like a two week thing.

But I did not go to art school. There's always something, there's so much I feel like I don't know and I'm always improvising, especially with materials or things like exhibiting. Framing, and how to do that all right. I also have a very small amount of... I have one photography work, I'm not a photographer, but, that just happened to be the medium that that particular series made sense in. In a way I think it's easier for me to work in a medium I don't identify as, like I definitely identify as a performer but I don't identify as a filmmaker but I do occasionally make films. In a way it's easier to do that because I don't

feel like I'm supposed to know what I'm doing necessarily, because that's not my main artistic identity, it doesn't feel... there's less pressure on me from myself to feel like I know what I'm doing. There's more room to be experimental but nobody taught me how to do this shit, I just have been paying attention and figuring out what works for me. Whereas with performance, that's a thing I think... when I moved to San Francisco I started being in plays a lot and little local community theater, mostly ridiculous plays but still fun and I was in rehearsal often and blah blah blah, and I think theater and performance is probably where I feel like I've had the most concrete training but then it makes me feel incredibly pressured because it's clear that there's a right way and a wrong way and I need to be good rather than 'eh let's just try this out'. And I talk to other artists and see what they do, get advice. I like artistic skillsharing. Do I teach though? I don't think I do. I don't think I have strong enough technique in anything I do to teach really, I feel like I can offer some support from my toolbelt but it's more at the skillshare level than at a 'let me show you how to do this'.

KHN: I think that also means to some extent positioning yourself as an authority...

SL: Totally, which to me feels very uncomfortable as an artist because I have pretty weak artistic self-esteem, and it's definitely gotten better in my 30s, but still.

KHN: Okay, I'm feeling pretty good about what I've gotten so far, do you have anything else to add, last comments you want to make, anything else you want to say?

SL: Okay. I don't think so.

KHN: Thank you so much.

SL: Yeah, thank you. Oh wait.

KHN: Okay.

SL: I think that especially ... I don't know if I do this with performance but visual, video things where there's a specific object or material that I have to manipulate, I think I talk to it a lot. Especially when I'm frustrated. But like, sometimes also with praise, where I'm like 'ooh, that was a good one'. But I think it's a ... this piece is a portrait of my friend Dr Hal, and I'll refer to it by his name, I'll be like 'come on Hal' or just talk to the material basically. I know that when I'm working on video editing I talk a lot to my computer and generally out of frustration but sometimes out of 'oh thank god, thank you for that'. Also I ask questions verbally out loud of my materials, like 'wait what am I supposed to do here, ahhh' . 'What are you doing?' 'Don't do that', yeah, things like that. That's the last thing, that was it.

KHN: Okay, thank you.

SL: You're welcome.

Interview with Soofiya

27 April 2017, in their teaching space, Ravensbourne University, London, UK

SF: I'm glad you missed out that bit there. [Refers to loud background noise]

KHN: Yeah, I was just focusing.

SF: Yeah.

KHN: Okay. So, can you briefly describe your practice and work process?

SF: Okay. So, I'm a graphic designer. So, I suppose I have two different processes. One which is the client's, the other which is a personal one.

When its client work, I tend to get a brief in. I start off and depends on the project. So, its defined in the project very differently to an illustration probably, whatever.

So, I get the brief in. I have a think. I make some notes. And I generally, for a client I tend to get a sheet of layout paper, pencil and sketch it off that. So a lot of them are small thumbnails. And it's just a case of me visually brainstorming again. Visually putting stuff down.

And so, I put that and then some processes take longer than others but after I've done that, I'm like, okay cool, this one and this one. And then I'd work them up. And so I use Illustrator, InDesign, Photoshop. And generally, I stick ... I jump between Illustrator and InDesign. Illustrator is great for vectors, vectors are great for shapes. So, I tend to build in the illustration the imagery and go from there.

InDesign is fantastic for layout. So, I mostly do my images, do my illustrations, do whatever. Then take them on to InDesign do my layout and processing like this in the project.

My feedback, that comes back with 21 changes and I would like get tweaks and there might be a bit of jumping back and forth. And eventually be at the stage where we're like, right we're happy with it, and I export it as a PPD file and sort of then I can tick it off.

That's a really condensed version of how it works. But a lot of the focus for me I guess is in the early stages of what is this gonna be, how is this gonna work, what is it gonna look like, what's the idea, what's the concept in terms of visually communicating.

So, I do my sketches. I have a couple of clients that I go to, so for me like colour is really important and like in terms of the way I work and the way I use them. I'm very into those things so I spent a lot of time choosing the palette, choosing ... yeah, just a really solid palette. Sometimes I like to be minimal. Sometimes I like to go all out and go, all of them.

Alongside that I think typeface as well is very important for the design and also icons. I use the Noun Project a lot. Sort of like a visual thesaurus just to get an idea of what sort of imagery I can use for

this. So, if I'm doing a project, I'm doing a project at the moment about DIY knowledge. I got some feedback, they weren't feeling it, so I need to get back to the drawing board. So, I was thinking about I'm going to Noun Project and type in 'knowledge' and just see what comes up initially.

So, I'm not gonna ... often it can mean quite literal. Like some of my stuff is stuff moving from back to, I dunno maybe I can get you know, the shape of a face or something like that, and then turn it into something else. So, I'm going to take a side profile, I'm going to take... sort of extract the ideas from that sort of seed. What else do I do. Yeah, but all sketching and processing.

KHN: So, in that process you ask the client to give you nouns or ...?

SF: No, not nouns. So, you know the Noun Project.

KHN: I don't.

SF: Okay. I can show you.

KHN: Yeah, sure.

SF: So, normally I'll get a brief and I'll look through the brief. So, I go and do this bit first. This one's an explanation of what I'm going to do. So, the Noun Project, great, on this one.

KHN: Okay.

SF: So, this is the idea when you use it. So, they want to make an exhibition of feminist art.

KHN: Okay.

SF: So, this is the explanation, the explanation of what's in that exhibition.

KHN: Yeah.

SF: So, sometimes the client might give me a paragraph just explaining what the project is. So, it might just be like, so mainstream, then party, then education. Just picking up those bits then. If they don't give me enough information I might research some stuff and I get some idea, so... knowledge.

KHN: So, okay.

SF: So, some of this ... that could be interesting, you could do some geometric interpretations. So, I could do a book, maybe. So, then I would take these and maybe work them up into something. So, this is an example of an illustration that I have going on. This is a personal project so it's different. But I dunno, I was trying to think of healing and how do you do healing.

KHN: Right.

SF: So, I used the Noun Project for healing and I can build from there. So, it's like I suppose when you're trying to write an essay and you're trying to find a really good way of capturing your idea. Putting your idea down. So, you look in your thesaurus, you try to find the hard words to capture that in the words that make sense to me.

So, I'm doing that visually. So, I'm trying to visually communicate something by you know looking at icons, doing that as visual language is very interesting. But then, taking it apart, deconstructing and then building into an illustration which is very communicative, something new that I think that meets the brief of what I'm doing. That's like a really small kind of, look at one of the ways I work.

KHN: That's really cool. I didn't know that existed. That's awesome.

SF: Yeah, right, it's a really good resource.

KHN: That's awesome. And how does that process differ when you're working on a personal project?

SF: With personal projects, sometimes the brief is a bit loose. So, it's less like, this content and this here. A lot of them sort of make themselves. Often I start with the subject matter. I start with my idea of something that I'll work on. I tend to start by designing first as opposed to processing thinking, and then I jump between the two.

So, the project I just showed you is called The Book of Anger. And it's inspired by sort of medieval text. Not visually, but stylistically. It's going to be a whole book of what anger is. So, there's nurturing anger, fruitless anger, and healing anger. And I see people who could then be like goddesses, or people, visuals or something like that.

So, that was the idea, and then, I dunno, one day, I started by collecting stuff just in life in general. So, like maybe I see something I like and I copy it, maybe a nice texture. And so that kind of visual cabinet just exists. And then I dunno 10 years from now or like five days, I'd be like, oh yeah, okay. And then it just clicks together.

So, that processes this idea in a more just organic and just sort of evolves. So, with this one, I just felt like I've seen this sort of vector style before, I've seen other people do it and I really liked it. So, I thought okay, well let's just make something. And I started by making nurturing anger. And that just sort of felt like, moving shapes about, going to the Noun Project, and try and think. I don't wanna be really literal with this cos I think this is a far more conceptual project.

Then did a bit of that. That fell into place. I'm like, right I'm gonna see how this translates onto fruitless [s.l.] anger. And for that, I was thinking like a desert scene where there's no rain, it's a parched drawing, but yeah, it's still kind of in the same visual language. So, that was how ... yeah, right so I've got the system that I'm using in the first one, how does that system translate it to the second edit, the second to the third edit and so on.

So, yeah, there was that, I suppose that came into it. But I think a lot of them, I kind left it for a week and didn't go back to it. Then came back to it and got fresh ideas. So, that's a lot of the stopping and starting process and there's no ... there's no sort of ... the end product isn't the main thing for me. It's like the process of getting it.

So, often my client, he gives me the answer, as opposed to, I go along and meet this bloke, I think the content leads to the answer to that. Whereas with client, often they can make it, like this way and I want this flow and I need this stuff. So, you work around that and the content fills into the place. Whereas this is content driven. And the outcome tends to ... I tend to fall back on stuff and come to them with just like book design or a print or something. But I think it'd be nice just to push that a little bit more in the future to see where it goes. Yeah.

KHN: That's great. That's really cool. Does your work involve working with or manipulating materials and ...

SF: Materials?

KHN: Yeah, and can you kind of describe what the process is like?

SF: What do you mean materials as well?

KHN: Paper, pens, digital stuff. I've had people do things with their ... people who do performance, like things on the body, clay and ...

SF: Oh nice, yeah. Yes it does like I guess. I'm trying think. I do a lot of stuff by hand. So, again, like drawing stuff. Yeah, a lot of drawing. Hand drawing. I've recently started exploring around linocutting I've yet to use that in a client project but I think that's really cool and fun process. I think for me when I'm working with material its more I'm open to the understanding of it. And then it might lead something, a client project for me to start on, but more its' just me understanding the craft process and the texture and getting the feeling.

Again, I think that goes to part of building up this visual catalogue that I've got. So, for me it's just, it's sort of like when you're an athlete and you're training, for me it's just training. It's not my final race that I'm running. I'm in general considering client in the case it's just a matter of going out for a swim or going out for a jog or something like that, which I think the linocutting is, or maybe going out on a screenprinting course, or trying a new material for a day. Or something like that, where it's just keeping those kind of just fresh and just working on it.

So, when I deal with materials, it's very much less about the end goal. It's just the process, it's just keeping me kind of, yeah, keeping me keeping that in mind, sort of like muscle memory and its, yeah. Yeah.

I'm trying to think of what I've done with getting all my stuff in this. Digitally.

KHN: Yeah.

SF: My process is normally digital. So, I use it Adobe and Adobe Suite. I focus a lot on Illustrator, InDesign and Photoshop. And how I process that sometimes is purely to choice and purely just things like the shapes built in Illustrator. I used to use textures quite a lot. So, I had my ... so, I had my file where I just, start this over, stuff like this where I scan in materials. Some of it might lead into like the

background of something.

Some of it I never used. Some of it is just there. But it's just nice to have that stock about. And I also stock for, I suppose, backgrounds and background textures. EPS files, which I just sort of collected over the years. The icons. The, I dunno, a map of Europe or whatever. I don't use them daily, but occasionally there might be something. There might be the odd job that comes in so, it's sort of building up a literal catalogue, a visual catalogue and all of these kind of resources that I can just pull in somewhere.

Risograph. I really love using the risograph. Do you know what that is?

KHN: Yeah, but maybe explain a little bit if you can?

SF: It's like a really old school photocopier. It sort of works on a stencil principle and level textured. And there's some really nice like common stuff, really DIY and quite economical because the more you print, the better. But I really like the process because the ink colors you're getting on the riso, you can get gold, black... So, I think in terms of outputs its really satisfying. It's very quick. It's a bit temperamental. It has a mind of its own. And I really like that and working with it.

So, I did zines on that. What else have I done. There's some posters. I use it for my teaching as well. So, we do like, do you know when ... do you know at school when you had a tea towel and we had to all like do a drawing with it in, like ...

KHN: Yeah.

SF: ... I dunno, primary school. We did some of that. I'm trying to find you a finished one. So, there was one like this. We made this scene and they all drew themselves, and then it folds up and that's really lovely and we had like, multiple colors. Let me see my ... so, yeah, I fold... outside design and own projects is my kind of main, like, split. Where's riso?

So, yeah, there was a bunch of stuff and I think it's more experimenting as opposed to it leading anywhere. So, I graduated and, oh I'm sorry I've missed it so I'm trying to get rid of it. Here I am 10 years later.

KHN: (laughter) That's quite funny.

SF: Like, just a quick thing from my CV. I think for me it's more about the process than seeing the outcome. So, yeah, cats again, like working ... cos it has to be black and white when you put it into the printer. But yeah, so it's just a very nice process again. I think I ... a lot of that outside design, those projects, they sort of differ, and maybe on the weekend I just do something fun, I just make something. I've got an idea. I see something I like and I wanna do something similar or what have you. And I just pop them here. And they might lead to something so ...

KHN: Yeah.

SF: Or they don't. Or they just exist here. So, there's one, I've really gone through this phase of

linking patterns. So, and there's glasses, then we ...

KHN: Can I film what you're doing on the computer?

SF: Yeah, yeah, of course, go for it. Yeah.

KHN: Okay.

SF: I find it easier to talk with that ...

KHN: Yeah. I didn't wanna do that without asking you first.

SF: Yeah, good call. I won't show anything sensitive, not that I have it. So, I went through this phase of just making patterns. So, breakfast. Cats.

KHN: Now, very nice.

SF: And a lot of wasn't ... and then this is not finished. Some crayons. Donuts.

KHN: Nice.

SF: So, yeah, I really enjoyed that process and I think it let me understand the direct vectors and to work. And there are just colour as well. And what was it. Yeah, so this one over here, I really enjoyed making this pizza print. And this led to, I did a risograph print of that. I also did somebody with mirrors.

So, then this is like the final version of everything I guess. It's this group, yeah. So, then I started off just doing that as part of like a pattern project, but then it led to something that almost like a projection of something I'd seen first. So, it was like looking around, and that was a sticker and stuff. Right. And then again, this was for a client, Gendered Intelligence. That process of learning how to make these led to this. And then this led on to some of the anger stuff that I'm working with that I showed you earlier, the future is this, the whole nurturing and whatever.

Cos it was working with vectors. So, one project is to hone the skills and process, materials, and then those lead to others.

KHN: Yeah.

SF: So, I keep it coming forward. If I'm really stuck doing digital work, I like to clarify it and go pick like a screenprint. I used this image, and like, cut this out, and I was awful at it. It was great. I enjoyed the process. And yeah. Any questions at all.

KHN: So, the last finished, and finished is something you can define according to however that works in your personal process right. So, like the last finished work that you made, do you usually conceive of the work you're making as like a finished piece or does it come to you more as more of a process?

SF: Again, like its if its client work, there's always an outcome in mind. If it's personal work,

generally I like that there's something I just work on. Sometimes like patterns, I just start doing them, there's no outcome yet, they're still in the process. And that's okay. There might never be an outcome. And I think that process is fine for that.

Generally when something's finished if it's on my website and it's got its own, like, little square, and it's printed and it's done. That's my mark of the finish. If it doesn't exist on here, it's still in process, it's still kind of being worked with. For me, that marker is, is it published, does it exist in the world, and outcome.

So, there are projects that exist in just like, just on my computer. They don't have a link anywhere. So, then for me, they're not finished because I go back to them and just tweak them. Whereas here, I can't really tweak them anymore once they are there. Which is nice, I think for me, that's what builds up or whatever.

So, yeah, for me they're not finished off. Like after the finishing happens, once, whatever circumstance, whether it's a built project that's just on here, like...

KHN: Cool. And do you like have the design in mind and then work toward it, or does that change?

SF: Yeah, it changes. Generally no. I have a feeling, or when I do, or a style I do. And then I go and like run after that stuff, processes it and find out. But generally, no, I don't think I ever ... it doesn't ... I try not to get too spearheaded, cos often when I get so wrapped in that, I forget the briefing to go on doing my content. So, if I leave it open, I focus more on the content, focus more on the client to explain what is needed. The rest answers itself if you're ticking these boxes.

Yeah, and what else. Yeah, I mean sometimes I have like areas I'm interested in. So, I was really into doing, I dunno, like so its hand drawn stuff, like letter press, but then I kind of got more about vector line stuff and I'm really to this sort of stuff. And then tomorrow I'll be into something, so I think, so right now I wanna do more of this, so that's what I'm continuing with. Now the next I'll move in a different direction. So, some, have a flavour of the month. It's not like set in stone. And, there's no ... the outcomes aren't set in stone, the flavours are there but the dish is get to come.

KHN: Yeah. Yeah. The dish is still yet to be put on the website?

SF: Yeah, exactly. Exactly. It's not on the menu.

KHN: Yeah. That's a very tidy metaphor.

SF: Yeah. (laughter)

KHN: So when you wanna achieve a specific result when you're making something, do you think of specific actions you need to take in order to achieve that, or does it kind of flow more organically for you?

SF: What do you mean, like an example would be?

KHN: Like do you go, okay so, if I want this to ... if I wanna achieve you know this particular visual result, I need to, you know.

SF: I need to use, this, this and this.

KHN: I need to like move X from point A to point B and then around...

SF: I think so. So, for example if I now want it to be clean, I want it to be vector-y like this, I know I'd have to maybe sketch it out first. And then ...

[new recording]

KHN: ... I think I just missed the last like ...

SF: Okay that's okay.

KHN: ... question.

SF: So, could you ask the last question again?

KHN: Yeah, its, so, when you're thinking of like a specific design you want to do, do you think of like ...

SF: Steps?

KHN: Yeah. Of the steps, or does that flow organically somehow?

SF: Generally I think, after years in my design process, it comes naturally. So, the design process, once you've got your head around it you can cut out steps and you can sort of jump to where you need to. But if I know I need to ... if I know I want this to start, when I want this kind of material, I know I want it to be clean, um, quite sharp. I know I need to go into Illustrator now to do these particular things.

So, I can sort of jump on the steps of anything around Photoshop which I used before on something. If I want it to be illustrated I know I need to start, that needs to be completely ... I know I need to use these effects in Photoshop, I need to do this part by hand, and use a drawing tablet, or do whatever.

So, it's a whole different process. I need to know what flavour to look for. So, I know what ingredients I'm using and then I can sort of put them together. So I generally, I think now having, after doing it for seven years I know this process quite well. A part of me worries that I end up just like plagiarising, I'm not fresh, and I don't discover new things, because of just repeating the same thing and cutting those corners.

But at the same time, if I keep building up my catalogue, I'll find something new and try exploring it and then I'll you know, try to do something fresh by playing around and.. yeah.

KHN: Great. Thanks for being patient with that as well. So, think about your process and the way you work with materials. And ...

SF: When you say materials are you also including the digital stuff as well?

KHN: Yeah. Totally. Totally. Thank you for asking. Definitely. So, like thinking about your process and about ... not about like the materials themselves. But about like the actions you're taking. Can you give some verbs and potentially adjectives, but not nouns, describing your process in terms of your actions?

SF: So, like what I'm doing when I'm using Photoshop, what I'm doing when I'm using Illustrator...

KHN: Yeah.

SF: Again, it all depends on what I'm gonna do. So, I'm gonna take that as this example of these kind of vector illustrations that I'm doing. For me it's composition. So, it's layering stuff up. It's, so like for this piece and my sketch, which I look at, I reference, but then I compose, it's like Lego and building stuff. Putting it here, and then sometimes removing it, or shifting. It's layering it up. It's keeping it quite, do you know, I imagine when you're cutting up stuff and you're sticking it down and pulling it around it, you're constantly shifting. It's like I feel like, do you know if I was cutting something in marble and they say that, oh the sculpture's just hidden underneath. I think it's like that just with shape, where I'm just chiselling away and stuff and then eventually it reveals itself. I'm kind of building it from these building blocks.

So, its crafting, its building, its composing, its ... I hope that's not interrupting [background music]. Are you okay with that? I don't know.

KHN: It's, it's funny. Go ahead.

SF: I know, fair enough. I do command my own soundtrack, so. Yeah, so its composing, its building, its shifting, its moving, its (loud music), I imagine it like sheets of acetate sort of stacked on top of each other, and moving stuff up to the front and the back, and like you know just layering stuff. What else am I doing. Yeah, including colour. It's like I think when you get a good colour palette it's like eating with your eyes. I really enjoy that kind of like when its beautiful and your vision starts to spread out, like I want my eyes to melt. Its, yeah, I think it's, I think it's something you feel as well. Like I'm just like, I feel it coming together. I feel it sort of shifting into something and then some ... when its, first you're building a skeleton, and then it's something that you get from something that's that shift and it's that kind of moment, and then it's something like, yeah, have just this and this. And then it just starts growing and it's so cool, which is really lovely.

I wanna spend the rest of my life chasing the feeling of, do you know like, its lunchtime and you're still hitting your brick wall and its hard, and just going nowhere, and you've got this block and you don't know what you're doing. And then suddenly you go for a break and you come back. And you're like, oh my god what about this. And you just move something and like everything clicks into place. And I've spent my life just chasing that little feeling, that moment there. Like that, that is in ... that's yeah,

that's what I feel. Okay.

KHN: Yeah. (laughter) Completely relatable. Definitely. Yeah. [pause]. Okay, are you good with that?

SF: Yeah, yeah, yeah. That's all good.

KHN: Do you wanna move on to ...

SF: Yeah, yeah, yeah, go for it.

KHN: ... the next question.

SF: Just throw them at me, I'll like, okay. Okay.

KHN: Okay.

SF: Yeah.

KHN: I'll ... I've never tried to ask two questions at the same time. But I'm gonna now, okay.

SF: Why not. Why not. Let's up the game here like. (laughter).

KHN: So, what do you feel like the most important for students, either you, or other people, is to learn when they are working with the materials you work with? Like physical skills now.

SF: Okay physical skill, but not like conception.

KHN: Yeah.

SF: Okay. That's a hard one, because like teaching, I'm like concept, it doesn't matter about the software, it doesn't matter about materials.

KHN: Yeah.

SF: You've got to be the designer and that, but knowing that I think, in terms of using the materials, I think it's, not I think it'd be intimidating, I don't think it'd be too hard, but the fact that this is no different from craft materials in using them in a comfortable way. You might be comfortable with, I dunno, drawing something on paper. Just cos its digital it doesn't mean it's any different.

It's the same process, it's just that you wanna learn where the right moment is. And so much of it is self-taught. I didn't ... I mean, early on I had a couple of lessons and whatever, but so much of it you learn during the process of doing. And I don't think anyone can really teach you that. And what's that, like really shit thing, that like, Malcolm Gladwell was like.. It was like you put in, 100, 10,000 hours or something before you become like an expert or whatever.

KHN: Yeah.

SF: So, oh no I don't know, I don't wanna agree with him, but I think you do. I used this every single day.

KHN: Yeah.

SF: Even on the days when I'm not designing it's still always in the background. Every day I thinking about this. I think I have a better relationship with this than I do with any human being in my life.

KHN: Yeah.

SF: It's kind of become almost wanting to reach the point of it becoming intuitive. Wanting to reach the point of it becomes nature of you almost just, your fingers can dance on the keyboards and that's it. That's like something that I really wanna aspire to, but that's sort of happened naturally, like so it becomes natural. I dunno, it comes, you get to that point when it comes like persevering and crying and Googling and it not working and all of it.

I think just treating it as a tool, which it is and not being as intimidated as ... My students love doing stuff by hand. They're very comfortable and some of them then get really intimidated by the software, and don't use it ... Or they use it, but they use it just to mimic that. And I'm like, this is a great tool for something else and realising the beauty of the tool.

What its used for. So for Photoshop, I use it for editing photos. I won't use it for type, I won't use it for my ad. Because that's not what the tool was designed for. InDesign is great for that. Great for grids, great for like, block type setting. So, I use the tool for what its designed for. I wouldn't use a paint brush to write my name on a form. It's that kind of ethos and spirit I think.

KHN: Can you change or reverse modifications and if so describe what the process looks for you?

SF: I know in Photoshop it's control z, or control/shift/z. It's a similar thing on Illustrator and Indesign. You've also got the history tool which you can go back, like kind of go back a stage, which I enjoy. I think a good practice is to save old drafts. So, if I've shut down and I go back to it, and I work on it and I'm not gonna stay, I'll save it as a .2 version and I've still got that version. I don't always do that cos I like to live on the edge and have everything crash and go on that way.

But yeah, I think, mostly it's that. If I do stuff by hand, I tend to work in pen and don't tend to undo my mistakes. With layer paper, which I love because, I work in pencil, so even if I make a mistake, I'll just go across a line, it's not about perfection. But, I ... it's so thin and its tough and it handles quite like inky pens nicely.

So, I do my sketch all messy and then I get another sheet and lay it over the top and do another draft. And then I might do another sheet or draft and try and get to this version of like neatness. But it's just a case of layering and layering it over to get to the layout I want. So, it's the main thing. If I'm working online, well its very simple work.

KHN: Yeah. I actually see some similarity between that layering and when you're saving all

your drafts. Right.

SF: Yeah. Yeah. Pretty much. It's just echoing both and just using the tools in the right way ... world. But there's so many parallels. Which is why I think my like ... my students don't like the idea of doing it on one or the other. And I'm like, but you're doing it on here, just translate it to the other one.

KHN: Yeah.

SF: I think once you understand that ... yeah, once you understand how it works, like in Photoshop you just have layers, just sheets of paper stuck on top of each other obviously, so treat it like that it is, everything is easier. Yeah.

KHN: Yeah. It can make it a lot easier to understand for people.

SF: Yeah. That's it, I think that like when you're using software it becomes this big intimidation thing. You have to press this button and go to the star and do that. Its, if you teach it where you use organic words or imagery, just stuff that we use all the time and compare, like a pen or a paintbrush, like there's ... I'm sure there's technical words for it. But I teach software to like adult learners, and I'm like, okay, now choose the softy brush and do some hard painting here. You know the fuzzy one, yeah, choose the fuzzy one. And then imagine the paper, okay so you've got to delete that. Click the post-it note at the bottom as opposed to the new layout icon.

And it's just little things like that, where you ... isn't it skeuomorphic design, where the design mimics... I think Apple's grown out of that, but it was very skeuomorphic, like a bookshelf looked like a bookshelf. I think its maybe similar like that, with like the language I use to teach design, or I'm thinking in my head, where am I, okay the post-it one does this. And whether its skeuomorphic thinking, I dunno if that's a thing, but yeah, have that parallel cos suddenly its tangible and it ... yeah.

KHN: Yeah. Yeah. Definitely. Yeah, that's ... can be a really important part of designing software for people who ...

SF: Yeah, yeah.

KHN: ... don't want to use the command line for example.

SF: Definitely. I think, so one thing, I find in the later versions of the software I use is becoming a bit more user friendly and to me a bit more ... we're designers, I'm a visual person. I'm not a computer nerd. I don't ... I mean I can't, I mean I try to code, but I'm not a coder. I'm not really into that kind of thing, command line stuff.

So, when it's something a bit soft around the edges and it's got these kind of references that I can understand and references in my language that I'm speaking, both visually, when you see an icon also, like verbally, it makes all the difference because suddenly I could like get that. So, you can go yeah, I'll save that, whatever. Copy? Yeah, I know how to make a copy you know. Its, yeah, I think that makes

a big difference opposed to most, like, coding it into this inaccessible like language of computer design. The people that are using them aren't computers, if that makes sense.

KHN: Yeah. Yeah. Yeah. Yeah. Yeah, I think there is ...

SF: (laughter) Yeah, cos I don't even ...

KHN: ... yeah.

SF: ... I just wanted to say something there...

KHN: Yeah, there is a lot I could say about that, but maybe not in the interview.

SF: Yeah.

KHN: So, we're at the point where we could start the material interaction portion.

SF: That's nice. Cool.

KHN: So, if you have something you wanna work on?

SF: Yeah, I do. I might just spend some time here.

KHN: Yeah, you can either work on something you're already working on, or ...

KHN: So, can you describe the actions that you're doing right now?

SF: Okay. So, I've got my document up. I think I'm gonna work on empowering anger at the moment. Yeah, but I'm not sure. So, in terms of ideas I'm thinking about, if I'm working at a desk, and again it depends where I work I like to have my notebook where I can just scribble, just think and like I let my hand do the work, I don't do the thinking on that front.

And then I'm also looking up on the Noun Project words for empowering, words for empower. I might jump through. Sorry this is my... So, right. So, again it's, I jump a lot. So, I might do it like this. I might get distracted and I might get somewhere on Twitter and I might find something good.

Authorise, commission. Delegate. Right. I also use my phone a lot as well. So, I find a lot of illustrations and designs on Instagram. I find that's a nice ... I can Google it and find just some nice little just ... It's like having a little book right. And you can just sort of flick through just like illustrators work. Who am I following. Well I really love Janine Rewell at the moment, just beautiful colour. So, sometimes I might just take a shape or something, or something like here....

I like this colour collector also. I like maybe collecting colours. So, I have my main art board in the middle. I'd use ... this is the artwork. This is essentially my desktop. So, just like, I'll have this book on the table, I have my desktop on the side. Me testing stuff... I really like these little illustrations so I kept them up here.

That was me drawing the face, yeah, like the original. I might keep it here, cos I might want the face... Well actually, that's not too bad.

KHN: So, what are you doing now?

SF: So, I'm essentially just building up the composition. I move this here and if I don't like it, there are actually samples like the cutter. I did this cloud, I kind of liked it, but I'm not sure, maybe I should go for a more traditional puffy cloud. I like sitting, sort of layered. Yeah, I'm just moving around the art board, just getting a feel ... for how it looks.

And like, and then sometimes I'm working on them individually, but I just like seeing them as a set. Cos maybe I can drag this bit of rain here. I've been using it for so many years, 90% of what I do is on the keyboard now, so I use a lot of shortcuts. It's an old term, drag and copy. Ah wait, let's bring that to the front. Yeah, maybe, I don't think I need rain for empowering anger there. I do like the bubbles.

So, I'm dragging that over, I'm zooming in. I'm pasting. Again, this is mostly due to a lot of just using it for so long. Otherwise I would have gone to edit and done it that way around. Which I don't do anymore. And just picking up different colours which I have like, in my pallet up here. So, sort of like you'd have a paint pallet, I just have that on top. I'm not sure about this bit though.

So, I'm just picking up this. I think of these as much on, imagine like on an elastic cord, these are, I've put a bunch of pins there. And so, I'm just pinning it here, pinning it there. And trying to think empowering there. So, empowering is....

I'm sketching it out at the moment, just cos I think, the looseness of this feels better then I'll kind of add it there after that. Okay, what's another word for empowering.

So, I'm just drawing it out here. Moving that onto the background. And then I'm putting the stroke up, just in here. I'm gonna change the colour. I think I might ... a nice yellow. So, for here, its interesting, I've got a bank of colours which I ... for each of my angers, so and this one fits with the yellow. Make sure.

I want to this to be slightly fatter. I think that'd be, like more of a lightning bolt. Yeah, like this. So, if I use my width tool and I can just drag it like that. That's not good. Okay, that's what I want. I'm looking at the drawing and I'm sort of looking at the screen. Like sort of life drawing, I think that one's better. And now I'm off to ... I wanna pull it out a bit more. I wanna pull this in a bit more. And a little bit more.

And again, going back to the width tool and just pulling it in again. But I want this to be flat. So, I think I might have, I'm sure there's another way to do it, but I'm just gonna do it the way that I know, I guess. Choose object. It's found appearance. Now this is all shaped, but I'm gonna merge it. Yeah. Okay. I'm just gonna pop that over the top, link up both and then that's gonna minus from that thing. So, feels like that, maybe... So, now it's moving stuff around. I suppose a lot like this.

I quite like this shape that was on my previous one. What would happen if maybe if I put this in beside

it, that might be weird, that might work. And then.

I'm going back to sketching. I'm still not sure. I don't know if its colours, but something's not feeling right. So, empowering anger, did a little doodle. So, on the Noun Project they have that fist, I guess. Maybe that's too cliched, I dunno. That's fine. There you go.

So, sometimes I just get bored with it and then get away from thinking about it too much and then I just ... let this happen. So, I'm just moving it about I guess. I don't think I like this colour palette. I might just go steal some colours, some of the ones that I had. But its keeping them quite separate, but I think for now, I might... that goes nicely. I don't think those are the right greens and that's why I'm stuck.

So, I'm gonna copy and paste this character over. I like this character, maybe I can do an empowering version. I didn't get everything up, so I'm just gonna move that. Move the 1, 2, 3, 4, 5. Copy and paste, okay. Right.

I'm gonna make another colour there. And there. And maybe take out the colour up here. A lot of this, I don't know, I feel like I'm just ... do you know when you're thinking out aloud, it feels like that, but on the page. So, every time I have a thought, I just do it. I think that that looks better. Yeah, cos when ... empowering can be like red and so yeah, let's do red.

I'm gonna take these out of here. I think they're quite similar to this, but I'll work it out.

KHN: Yeah.

SF: I don't want the hair to be too similar to the one before. So, ... well maybe it could be like that. Yeah, okay.

And I'm going to move this back here ... where's that. Did I delete it? Oh no. This might work, it might not. Maybe we could do this as hair. So, I'm just redrawing it and hopefully make the stroke a little bit bigger. I think this could be a cool hat. And then back to that width tool. Kind of, the hat should be pointy at the top. And then maybe like that. So. Something like that, yeah. Maybe with a brim.

KHN: What are you doing to the shape?

SF: To the shape, I just drew another line and I'm just making it a bit smaller now. So, I want this to be a brim. And I might, I'm not sure we can actually cut off the end. No. Maybe. Yeah. I'll figure out how the rest of this looks again. Much better.

So, the shape tool, I'm just gonna choose a polygon, I'm gonna click on the page and then resize and then ... I am now sending it to the... there. And like that, I don't think that the green is gonna fit. Let's change it then.

Empowering should be... So, I have my palette then I'm just gonna refine it a bit with this. Sort of like when you're mixing paint, just add a bit more water. I'm not sure about that. And so, I might need

to add to the palettes. I might have a couple of things that I like. I'll just find...

So, I have ... up, first. That's better. So, designers I like, that use colour really lovely. I don't know if this is cheating, but this is how I work. So, I see what kind of colours they've used and sort of try to kind of like mimic them. Or see what works. Which one feels most empowering.

I like that orange. That orange can ... right let's move that there. So, what I really love about Illustrator it's got colour bits. Again, I don't think this is necessarily a professional way to do it. This is just how I work. So, it's got tonnes of pantone colours. And I just pull up one of those libraries which is on the canvas like this. And I just like kind of like mosey through and a try a few, and yeah. And switching this here. And this.

And yeah, this is 90% of my life. Like just background colours like that. Ooh. So, this is like a stripe that I've got on top of it, but I don't wanna change it above that. I just wanna change it over here. No, that's too much.

And I'm just gonna change the kind of the sun cos I think the green looks a bit weird now. Ah, yes, I like the cloud, I like it. So, I think I want a conflicting green. Ah, maybe a blue. Yeah, I'm just trying to find a nice blue.

Yeah, I'm not sure about this. So, I'm gonna move this here cos I don't think it's gonna annoy me. These are lines, so I'm just gonna change them into a shape. So, like change the colors here and then the shape, and then merge them. Merge the other shapes. So, I'm gonna merge that as a shape, I explained. Okay. Right.

KHN: Okay. If you wanna move in the direction of a place that feels comfortable for you to stop, so we can ...

SF: Wrap up, yeah.

KHN: Yeah. Wrap up the interview.

SF: Yeah, this is fine. I can stop. I'm gonna come out from there.

KHN: Are you sure?

SF: Yeah, yeah. I'll carry it on later. This is ongoing.

KHN: Yeah.

SF: Literally, it's gonna be like another 10 days of, no not that orange, no, maybe a pink, oh no, and then all the back again.

KHN: I fully understand.

SF: I think I'm happier with the slightly cocked hat, yes.

KHN: Yeah. It was really nice. I did like the triangle dress ...

SF: Yeah, I can ... I might bring back in again.

KHN: **It looked like a kind of crouching...**

SF: Yeah, yeah. She's ready to empower.

KHN: **Yeah.**

SF: (laughter) Yeah.

KHN: **Crouching goddess.**

SF: Yeah. Yeah. Yeah. Nice. Okay. I'll put it right back.

KHN: **I'm in.**

SF: I'll let you know.

KHN: **Yeah. I might cut this out of the interview, but what do you plan on doing with ...**

SF: With this?

KHN: **Yeah.**

SF: So, I'm working with a publishers in New York ... And so, we had a little chat, and when you know, I throw some ideas out there. And hopefully, either it's gonna be a book called anger, and again, a set of illustrations in one. Or, I had this idea with being like sort of a myth. So, people talk about this book of anger, but no one's ever seen it and there's bits in the British Library and there's bits here. And we're publishing this secret collection of stuff that they've found.

So that would be the book of anger, and some of those would be these cards. And so these are the ones that are left over, these are gonna be in this. And so, yeah, then there's a talisman as well to go with it. That you can carry around, this is your anger talisman. And potentially it could lead to other books, so there's a book of anger and there's also the book of healing, there's also the book of joy, pettiness or whatever. And, so its building all of this up. Oh, the book of bitterness.

KHN: **But the pettiness is ...**

SF: Yeah. Yeah.

KHN: **... okay. Yeah, yeah. It's very of this moment in time I think.**

(laughter)

SF: For sure. So, yeah, hopefully its gonna piece into something. I'm not sure what exactly that is, but I know working on these illustrations, I'm going to keep that style. I'm excited about it. I'll let you know how it goes.

KHN: **Please do. It's amazing. Okay, so, I have one more question and then you get time for comments if you wanna say anything else.**

SF: Perfect.

KHN: So, I already know that you teach, but can you describe sort of the level of students you teach?

SF: Yeah. So, it's ...

KHN: And if you any other teaching outside of here?

SF: Yeah, so I do lots of different things. Yes.

KHN: Okay. Cool.

SF: So, I ... my main thing is I teach 18 to 19 and 20 year olds. This is before they go to uni, a sort of foundation course. And they essentially prep their portfolio and get themselves ready. It's a year. It's quite intense. But, you know it seems to be good. So, I teach on that.

I used to just come in as a day professional, but right now I'm doing everything from planning briefs and lessons and stuff. Sort of delivering and everything like the essentials and like other tutoring duties. So it's good. I enjoy it.

And I also teach sometimes on the BAs, taught to Fashion, taught on Design. So, it's quite mixed. Also, I've done stuff like with some secondary school students which was really different. And they're so cheeky and lovely and it's really, like it's, I couldn't do it every day, but I really enjoyed going in and doing some workshops with that age range.

I'm doing one with the Tate soon hopefully with schools that don't ... It's called Art for All Scheme and it's schools that have a high percentage of free school meals in schools that don't have assistance and bring them into the space and to hold space through zines and how to design them. So, that's really lovely. I'm looking forward to that.

I visit a lot of unis and do like short lectures and feminist, either like political lectures about like feminism, anarchism, or like, design work.

KHN: Nice. [long pause]. Any other comments you have on any aspect of anything I've asked you about?

SF: I don't know. Yeah, I don't know. I find it easier to riff off with like questions. I'm not sure what else would be relevant. What would you need to know? I guess like don't you know that would be worth discussing that, might ... any tangent I guess. I don't know.

KHN: Yeah, I mean, I can't think of anything we haven't ...

SF: Touched on.

KHN: ... covered. But yeah, if you have any other comments on how you work with materials, or how you feel that your process or ...

SF: Yeah.

KHN: ... the action process, so yeah.

SF: Yeah, I mean, I think once you know when it comes to just ... once you understand it, it's fine. Like once you get the process. And that process I use in anything and everything. Like I use it to understand what I do. It's how I see everything pretty much. So, generally when it comes to personal work and my stuff, I use it process something else. And something I'm angry about, something I'm feeling at the time.

So, there's, I did a scene about menstruation. And so, I was just really annoyed about my period, and that was enough. And that led to me to process something and kind of, just through work, and through a design. And that process of essentially, of making that, like you know putting stuff on a page, of layering it, and doing whatever, and creating the visuals to go with it, something helps deconstruct it in your head. I find it so resolving, and so amazing, and it's so fulfilling.

Like, I don't how I'm gonna ... I don't know how to see them, whether I'd be if I didn't have them. Like, I don't know how I'd see the world, or who I'd be if I didn't think like a designer. I think its ... yeah, I think it sounds a bit likely but like, it's true. Like I think, I dunno, its somehow in your DNA , like this is how I process the world. Its everything. I dunno. I don't know what I'd do without it, but yeah. It's my best relationship.

It's the best relationship I've ever had. It is so stable, it's so loving. I think if you commit yourself to it, it will give like 10 times over for me. That, okay, no, please don't put that in the interview. (laughter)

KHN: That's so beautiful. I can take it out if you want.

SF: No. No. Okay. Okay.

KHN: But it's very, yeah.

SF: Yeah. It's really lovely, yeah. I think when you find something you love, like that's it. And that process can translate to anything. So, if I don't understand, I don't think. I suppose it's like the work ethic or whatever, it's so transferable. I think like, you know, give me anything and I'll design my way out of it.

Yeah, it's about designing the way out of problems and like a problem solving thought process.

KHN: Okay.

SF: Yeah, brilliant.

KHN: Amazing. Thank you.

SF: That was cool.

KHN: It was I think.

APPENDIX C ARTIST INTERVIEWS: ANALYSIS CODES

Initial Theme Codes	Description	Sources	References	Example
5 Verbs	Participant response to "Think about your practice in terms of action and interaction with material. List five verbs or adjectives that describe your actions during your practice."	6	10	Yeah, so it's composing, it's building, it's shifting, it's moving, it's (loud music), I imagine it like sheets of acetate sort of stacked on top of each other, and moving stuff up to the front and the back, and like you know, just layering stuff. What else am I doing.
Changing or Reversing Manipulations	Participant response to "Can you change or reverse modifications you have made? Please describe."	6	11	I think that's a dangerous, or a hard, part of working digitally. You have this power of going back, and in a way it's almost like going back in time, like if you could reverse a situation or an action in your life. That's pretty dangerous. I also think that it's not necessarily the best learning tool to have that much freedom. In a lot of things in life, the ability to fail and learn from your failures... if you have that much control you're not really allowing yourself to take those risks and chances or evolve, and I think that for me at least, within my art practice and even within my life, it's about taking huge risks, and not being able to go back, committing to that decision and whatever the outcome is, it just is, whether you agree with it or think it's great or whatever. I think it's important to let those things exist how they should exist. That's just me thought for myself, how I work.
Description of Work and Practice	Participant response to "Describe your practice and artwork."	6	18	So I, mostly I get tied up, and I tie myself up. Um, so when I'm getting tied up, it depends, I really prefer, depending on my partner who is tying me, I would like to get their input because it is for me a process of taking up certain things, although I have certain preferences. When I tell them for example that I prefer having ropes over my face, I don't explicitly mean that they have to put it in a certain way. For example, if you're putting it over my mouth, be aware that I have two implants in my mouth. But the way that they put it over my mouth could be hard, loose, knotted, not knotted, over a scarf, not over a scarf, that sort of stuff is their creativity that I'm letting in, and when I'm tying someone up I sort of expect that they'll be open for my creativity, because it is something that we create together within the boundaries of each other. I also have my own boundaries when I'm tying, I can't tie certain positions. I don't feel like tying certain things on certain people. And that is very important, because if you work with creating immobilities and creating sensations and immobilities, physical and emotional.
Intuiting or Thinking About Steps	Participant response to "Do you think of specific actions you need to take in order to achieve a physical result?"	6	6	I think it flows more intuitively. I think there's some things that, depending on the material, you have to follow a certain formula for it to work. Sort of like, for things to be activated. SO those are practical, formalist things you just have to do. But more or less it's intuitive, like the more abstract sculptural stuff that I make, and that's more intuitive. The shapes they evolve into, the structures in all of that and the color

				palette. The more formal stuff is quite intuitive once I get started.
Manipulating Materials	Participant response to "How does your work involve physically manipulating materials?"	6	15	Well. Yeah, it depends what media I'm working in. For linoleum cuts, I have to carve, like I carve, draw on and then I carve a sheet of linoleum, I have a chisel and I take long shreds of linoleum out. And then, I have this block and I roll on ink and then I print it. So that's a lot of different physical manipulation of materials.
Manipulation Session [not child coded on its own]	Participant discussion during the material manipulation session.	6	9	And I'm just rolling, rolling, rolling. What I've learned is the most important part of this is using your whole body to push forward and not just like your arms and your wrists. That's a big part about ceramics and throwing, it's really like putting your whole body into it so you're not just hurting one part of yourself.
Most Important Physical Skill	Participant response to "What has been the most important physical skill for you to learn?"	6	7	Like just on a very basic level, like be able to use like power tools and build stuff is quite important. It's a universal tool that is necessary for, yeah, even everyday stuff.
Process	Participant response to "Think of the last finished piece that you made. Did you conceive of its physical form before beginning to make it, or did it shift over time? Is this typical of your process?"	6	19	With personal projects, sometimes the brief is a bit loose. So, its less like, this content and this here. A lot of them sort of make themselves. Often I start with the subject matter. I start with my idea of something that I'll work on. I tend to start by designing first as opposed to processing thinking, and then I jump between the two.
Teaching [not child coded on its own]	Participant response to "Do you teach?"	5	5	No, I think most of my teaching is around BDSM or sexuality, not around art-making. I sometimes give people specific ... something kind of like tutoring or something? But very rarely and pretty randomly. Like someone's like, 'I want to start practicing drawing, do you have some way to help' and then there's also the fundamentals of drawing that I've completely forgotten and I'm always like wait, what about shading again?
Manipulation Verbs	Verbs used by participants during the material manipulation session	6	518	wedging
The Unexpected	Instances of chance, surprise, or serendipity discussed during the interview	6	47	Yeah, for it to work but then I give up all control when I'm actually making the pieces themselves, slip casting, and I really love that part because I feel like I really don't enjoy hand decorating stuff and the way I'm doing things now is it does it for me. The colours do their thing and then I get to see what it made which is great and then I get to do the finishing touches on the work but a lot is left up to chance for I guess the creative... What people would call the creative part of it, of the final piece is, I don't want to control it so...
Why We Use Tools	Reasons participants expressed for using tools or materials	6	40	I'll use, for example, natural light because it appeals to my aesthetics without having to know exactly what I'm doing camera wise.
Body as Material	Participant describing their body as	3	40	I think for me, since performance is an art, it is a mental process, and I think of an

	a material in artistic work			image or a message I want to give to people, and I also... but this is a body performance, it is something I create on myself, so it has to also feel okay in the larger sense of the word okay. I can't do it for the message, it has to come from me and my body to give the message in this format.
Body as Practitioner	Participant describing their body interacting with material as a practitioner	6	67	Yeah and it's like ... and then you like, mixing from going up and down to a lot of circles with both my hand and something heavy. A lot of attention to the corners, because that often solidifies the piece, like if the corners are well-printed, variations in the middle are easier to... yeah.
Body as Secondary Artistic Subject	Participant describing representing the body in artwork	5	17	Like some of my stuff is stuff moving from back to, I dunno maybe I can get you know, the shape of a face or something like that, and then turn it into something else. So, I'm going to take a side profile, I'm going to take... sort of extract the ideas from that sort of seed.
Identifying with Material	Participant discussing specific identification with their material	4	4	In a way I think it's easier for me to work in a medium I don't identify as, like I definitely identify as a performer but I don't identify as a filmmaker but I do occasionally make films.
5 Verbs/Child Codes	Description	Sources	References	Example
Bending	Verb	1	1	[None, single verb]
Building	""	1	1	""
Chasing	""	1	1	""
Chiselling	""	1	1	""
Cleaning	""	1	1	""
Communicating	""	1	1	""
Composing	""	1	1	""
Contorting	""	1	1	""
Crafting	""	1	1	""
Cutting	""	1	1	""
Dropping	""	1	1	""
Drying	""	1	1	""
Eating	""	1	1	""
Exhausting	""	1	1	""
Falling	""	1	1	""
Flying	""	1	1	""
Gentle	""	1	1	""
Growing	""	1	1	""
Hanging	""	1	1	""

Impatient	""	1	1	""
Imprinting	""	1	1	""
Intending	""	1	1	""
Layering	""	1	1	""
Limitation	""	1	1	""
Obligation	""	1	1	""
Patience	""	1	1	""
Pressing	""	1	1	""
Putting	""	1	1	""
Relearning	""	1	1	""
Removing	""	1	1	""
Restricting	""	1	1	""
Shaping	""	1	1	""
Shifting	""	1	2	""
Tightening	""	1	1	""
Timing	""	1	1	""
Touching	""	2	2	""
Uneindeutig	""	1	1	""
Waiting	""	1	1	""
Other/back and forth between improvisation and obligation to how things are 'supposed' to be	summary of content	1	1	I feel like there's a lot of back and forth between improvisational things and very fixed things, like the way that things are supposed to be or the way that I'm supposed to work from what I've learned or what I think is true or whatever, and then some kind of more open, playful experimentation.
Other/care, fragility, gentleness, patience	summary of content	1	1	Slow. Like going slowly. Careful, I don't know to say like being super, super careful and not rushing through things.
Other/communicating intent as first action	summary of content	1	1	Yeah, I mean like communicating intent, I mean communicating is obviously one of those things.
Other/constant relearning, never skilful	summary of content	1	1	But I never get to the point where I feel like I'm super skilful at the media I'm using. There's a lot of relearning.
Other/digital media as having physical depth	summary of content	1	1	Also, when I work with video or photography, there is something that I take the photo or the video of, which is also like three dimensional or has depth. Yeah, I guess that's quite okay.
Other/dirty materials	summary of content	1	1	So, for the material itself, I like if the material is dirty, or also if I get dirty by working

				with it.
Other/dropping as last physical and emotional action in performance	summary of content	1	1	And um... there's a word that I haven't thought about, that I haven't thought through, falling, but not in the sense that you drop someone accidentally, but there's a falling, dropping, in an emotional and also physical sense, you literally fall onto earth after you've been... you know. And um...
Other/everything clicks into place	summary of content	1	1	And you're like, oh my god what about this. And you just move something and like everything clicks into place. And I've spent my life just chasing that little feeling, that moment there.
Other/fragile material	summary of content	1	1	And if the material is kind of fragile.
Other/impatience with self	summary of content	1	1	And, but I'm also impatient concerning myself. So, my impatient would also be an adjective that would describe myself during the process. But I don't like it actually, its just a fact.
Other/Leaving imprints of individual touch	summary of content	1	1	I'm interested in sort of how to leave like the artist, ie me, 's DNA or identity behind. Right now, it seems like we're as a society or culture, not interested in leaving any form of identity behind in some way, and I'm kind of interested in how it is that I can do that in the material that I'm using.
Other/Making something exhausting and not easy	summary of content	1	1	And maybe when I think about me working with things, I like it exhausting for me. I like if I really, if its like kind of exhausting to work with it, and its, yeah not so easy to do the things. Cos I sometimes have this, yeah, can everybody just do it. No, I wanna make something special or something different.
Other/Need a specific challenge to work with	summary of content	1	1	So, I also need to be specific with it, or yeah, not just have a brick and hammer it, but really somehow I have a challenge by working with it.
Other/Piecing together, layering, uncovering, building	summary of content	1	2	Putting it here, and then sometimes removing it, or shifting. It's layering it up. It's keeping it quite, do you know, I imagine when you're cutting up stuff and you're sticking it down and pulling it around it, you're constantly shifting.
Other/Practice as very bodily	summary of content	1	1	I mean, I think it's 'physical', it is physical, it's quite bodily, and I think within my work I'm interested in... okay, I'm just talking now, I'm sorry. But I'm like...
Other/Preferring three dimensional materials	summary of content	1	1	And I'll try to think of a very that would also fit in this. [long pause] Touching I guess. Or to touch. I, that's I think why I don't like to paint or draw, because its so two dimensional. And, when I work on a sculpture I can ... it's a form, its it has a body or something like that.
Other/Pressing harder than is good	summary of content	1	2	Hard, or pressure. Even when I draw, I press hard. It's a lot about pressing hard, like harder than I even think is good.
Other/Satisfaction in physical work	summary of content	1	1	There's also a definite sense of especially when I'm working on visual things with my hands, that feels really good to me, satisfying or like a sense of fulfilment to me or something like that.

Other/Stress, interpretation, flow as process	summary of content	1	1	Stress... interpretation or interpreting... insecure... but then what's the other part, the middle part... flow, I guess.
Other/Touching, tightening, hanging, contorting, intending during tying	summary of content	1	1	Touching. Actions.. tightening up. And... maybe more like hanging? That's very crucial as well. Contorting. Maybe.. would 'intending' be one of those things?
Other/when you get a good colour palette it's like eating with your eyes	summary of content	1	1	Yeah, including colour. Its like I think when you a get a good colour palette its like eating with your eyes. I really enjoy that kind of like when its beautiful and your vision starts to spread out, like I want my eyes to melt.
Changing or Reversing Manipulations/ Child Codes	Description	Sources	References	Example
Allows for mistakes to look intentional	Some material allows mistakes to look intentional and be easily incorporated	1	2	So if I make a mistake or I forget something or whatever I think it's more about me and if I can recover in the moment with an improvisation that I still feel committed to or whatever, than it being clear in the outcome, like the perception of the work. Whereas with this, if I cut a big line through my thing, it's like I either decide that my thing is going to have a bunch of lines through it and that'll be the new style, or it just looks crazy. It looks like a slipped and cut a big line through it.
Discomfort with the performer's discomfort when working with the body	Unintentional audience discomfort created when with performer is uncomfortable, particularly when that was unexpected	1	1	Though sometimes I'm surprised, usually I've gotten quite good at placing it in the right place with the speculum pretty fast and getting it in the right place, but sometimes I have to dig around, and then the audience has to watch me dig around and get increasingly uncomfortable. Usually because I think for many people it's intense to see someone stick a speculum inside themselves and open themselves up and invite people like yeah, come look! But then if they perceive that there's a relationship to physical discomfort, that it's not going easily or whatever, I think it can really freak people out. Or sometimes my cervix looks weird where I'm like huh, okay, this is what's going on now. Yeah, there's a lot of body manipulation things like that and interacting with objects in performance.
Easy to reverse	Participants report easy to reverse modifications	2	2	I know in Photoshop it's control z, or control/shift/z. It's a similar thing on Illustrator and Indesign. You've also got the history tool which you can go back, like kind of go back a stage, which I enjoy.
Importance of learning from failures	Participant expressing importance of learning from failure in her work	1	1	I also think that it's not necessarily the best learning tool to have that much freedom. In a lot of things in life, the ability to fail and learn from your failures... if you have that much control you're not really allowing yourself to take those risks and chances or evolve, and I think that for me at least, within my art practice and even within my life, it's about taking huge risks, and not being able to go back, committing to that decision and whatever the outcome is, it just is, whether you agree with it or think it's great or whatever.

Material is improved by continued reuse	Participant using material where mistakes are particularly advantageous	1	1	And the more, something I love about clay also is the more that you use a single ball of clay and you make a mug and you don't like it and you smush it back and you re-wedge it, the more you do that, the better quality the clay is. And if you could keep the same like 20 lbs of clay going for a whole year to practice with, it'll just be better and better quality, which is kind of cool. The throwing, there's memory in the clay and when you throw it you move the particles in a certain way and it like realigns them and the more you do that, the better you can throw with it which is really interesting.
No going backwards	Not possible to undo mistakes	1	1	Yeah. Yeah, but there's no going backwards on the same piece with clay. Or with what I do with clay. Yeah, something is alive over there.
No reversal but adaptation is possible	Not possible to undo mistakes but adaptation can be done	2	4	Reverse? Not. Now because I work quite a lot with concrete and plaster, reverse is very hard. You have to just start all over again. But you can make adaptations by ... [sanding].
Nothing is truly reversable	No manipulation can really be reversed	1	1	You have this power of going back, and in a way it's almost like going back in time, like if you could reverse a situation or an action in your life.
Practice of saving previous versions	Participant describes saving previous versions to branch off in multiple directions	1	2	I think a good practice is to save old drafts. So, if I've shut down and I go back to it, and I work on it and I'm not gonna stay, I'll save it as a .2 version and I've still got that version. I don't always do that cos I like to live on the edge and have everything crash and go on that way.
Recycling rather than reversing	possible to recycle but not reverse	1	1	With throwing, yes, because throwing is all about recycling.
Room for surprise	room for surprise in working with the body	1	1	I've done this plenty of times, it's not like it'd really get stuck, but in this particular moment it took FOREVER, and then I had to work with that, also being stressed out like what if it doesn't come out! That's the whole thing I'm doing! I guess there's a lot of room for surprise in that way that I do performance, and especially in the ways that I manipulate my body or the props that I'm using.
Starting over is the only way to get rid of mistakes	participant description of experience	1	1	So, I guess for a perfect, whatever perfect is, but a result that doesn't show your mistakes, I guess starting over would be the best method.
Translating digital processes to physical and vice versa	extension of the ease of reversibility in digital media	1	4	I think once you understand that ... yeah, once you understand how it works, like in Photoshop you just have layers, just sheets of paper stuck on top of each other obviously, so treat it like that it is, everything is easier. Yeah.

Viewers can tell you've made a mistake, unless you make it repetitive	repetition as a way of disguising mistakes	1	2	So if I make a mistake or I forget something or whatever I think it's more about me and if I can recover in the moment with an improvisation that I still feel committed to or whatever, than it being clear in the outcome, like the perception of the work. Whereas with this, if I cut a big line through my thing, it's like I either decide that my thing is going to have a bunch of lines through it and that'll be the new style, or it just looks crazy. It looks like a slipped and cut a big line through it. I guess that's how I imagine it.
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Description of work and practice/ Child Codes	Description	Sources	References	Example
Bernie/Detailing	Participant description of aspect of practice	1	1	Yeah, and then I use gold lustre on my work and I'd say that's about it.
Bernie/Fixed Process	Participant description of fixed process repeated in work	1	1	then I do slip casting which involves having a prototype, usually something that I throw on the wheel and then making a mould out of it so I use plaster and I've become very good at making moulds and it's part of my practice now. And so then for the slip casting I use a liquid clay and I use different colours.
Bernie/My material is what I am	Participant description of identification with primary material	1	1	Oh yeah, I've done all sorts of other stuff but right now I'm really just doing clay because that's what I am, what I love.
Bernie/Slip-Casting	Participant description of primary process in work	1	1	then I do slip casting which involves having a prototype, usually something that I throw on the wheel and then making a mould out of it so I use plaster and I've become very good at making moulds and it's part of my practice now. And so then for the slip casting I use a liquid clay and I use different colours
Bernie/Throwing Pottery	Participant description of primary process in work	1	1	I throw a lot of pottery, so that's like throwing clay and the wheel and different like little wooden tools
Clyo/BDSM and porn influence but not the main element in expression	Participant description of distinction in work	1	2	And it is a part of the BDSM culture, but for me it's not necessarily the same as 'playing' in a BDSM sense.
Clyo/Collaborative and creative process with another person	Participant description of process	1	1	So I, mostly I get tied up, and I tie myself up. Um, so when I'm getting tied up, it depends, I really prefer, depending on my partner who is tying me, I would like to get their input because it is for me a process of taking up certain things, although I have certain preferences.
Clyo/Creating immobilities and sensations	Participant description of outcomes	1	1	I also have my own boundaries when I'm tying, I can't tie certain positions. I don't feel like tying certain things on certain people. And that is very important, because if you work with creating immobilities and creating sensations and immobilities, physical and emotional.
Clyo/Practice that can be done to oneself and others, or experienced on the receiving end	Participant description of aspect of practice	1	1	The practice is called rope bondage, and it can be about tying someone up, it can be about getting tied up, or tying oneself up.
Clyo/Pushing the limits of the body, working with the body	Participant description of outcomes	1	1	I'm also interested in tying myself up in suspensions that are really painful, so that I have to cope with the pain on my chest, while I'm tying my legs so that I can release myself from the chest pain when I'm hanging myself up by my

				leg.
Clyo/Ropes, whether floor or suspended	Participant description of materials	1	1	And suspensions or not, floor work is just as much bondage. It's called rope bondage because I do it with ropes, you can do it with hemp or I prefer jute ropes.
Clyo/Self as material	Participant description of materials	1	1	But when I tie myself up, I'm aware of both my own immobility and how I deal with that immobility. So it is for me like a process of creating a boundary for myself and trying to push it and cross it and see ... Currently... although I'm super interested in contorted positions for myself, like trying to see if I can give myself a hogtie, which is... I'm working on it.
Clyo/Self-Tying is most valuable as performance	Participant description of aspect of practice	1	1	I think the performance aspect of bondage is most valuable for me when it is self-tying. That is, one person interacting with the audience and it's a different art that someone tying someone up in a performance setting.
GeoVanna/Appropriation, objectification, identity	Participant discussion of themes in work	1	1	And kind of how between those lines blurring... what sort of dialogue is addressed through it and what sort of issues arises and ideas of representation. So representation of your identity, representation of your gender, like an object of artwork... essentially kind of how it's, I feel that it's kind of hard to differentiate between all those things because of appropriation and... sort of the idea of objectifying anything, so either like objectifying humans or yourself or your environment or nature or technology.
GeoVanna/Immersive constructed space engaging all 5 senses	Participant description of outcomes	1	1	I'm really interested in being able to sort of tap into all bodily senses within an installation. So like I'm definitely concerned with not only the visual but also how the environment effects what you're listening to, what you smell, how you feel inside of the space. So within that there's always.. I wouldn't necessarily call it interactive, but like, these things are within the air. So I'll use sound, I'll use scented fragrances, as an example of an installation. And with all of those things, it's very much about using synthetic materials that have been made, usually things I've actually made, to mimic things in nature.
GeoVanna/Installation and sculpture	Participant description of outcomes	1	1	Yeah, so my practice is quite installation-based, and sculptural-based.
GeoVanna/Interested in the tactility and versatility of clay	Participant description of aspect of practice	1	1	And I think it's also an undermined material, like clay practice, people who actually do ceramics, it's very undermined. I think it shouldn't be. It's one of the most tactile practices that still exists within contemporary art. I think it should be appreciated a bit more. I'm really interested in it as a material at the end of the day. And it's a material that can be manipulated in so many different ways. I think that's very much connected to the ideas that I'm

				interested in within my practice.
GeoVanna/Real and virtual in unison	Participant discussion of themes in work	1	1	A lot of it has to with the construction of identity and also re-appropriation, so representations of whole selves and their existence within the real and the virtual world and also how those two worlds aren't actually separate but are in unison with one another.
hari_klia/body as material in performance	Participant description of materials	1	2	And so, when I do performances with my own body, I guess its material and then everything that surrounds it, so I can transfer my message is also my material.
hari_klia/costume as material	Participant description of materials	1	1	But when I do performances on a stage with a crowd and I have a like a choreography already planned and a timeframe, I definitely think of a more theatrical costume. And I really like morph suits a lot, so I, because it has this anonymity and a very nice beautiful texture, and if you, yeah if you maybe also hide your breasts, or move in a certain way, its also very gender ambiguous.
hari_klia/idea leading, material following	Participant description of process	1	3	And I, so I just started to experiment with a lot of new material. Before that I really mostly just used, general ideas that I would then transform into, okay what can I use to transform the idea.
hari_klia /little emotional connection with drawing and painting	Participant description of preference	1	1	And I experimented a little bit with drawing and painting too, but I just, sometimes it looks good, sometimes not. But I just don't feel any emotional connection to those works.
hari_klia/making moulds	Participant description of aspect of practice	1	2	But that's a different method than when you built the negative and then you fill the negative ... with something and then you have also the sculpture. But the starting point is very different. So, I haven't worked with the first one yet, so when you have something and then you carve something away, and so your sculpture is there all the time, but you just to form it. I just worked with things that I made out of material that you have to either mix or build your self, so it has a form in the end.
hari_klia/using art to open minds	Participant description of outcomes	1	1	And my works are somehow related to, in a way that I want to maybe educate people, or just educate in the ways that I think and look on the world to open up minds. And in the end maybe create a better world, or maybe a more open minded and accepting world. Yeah, that's all actually.
Sadie/atmospheric, durational, interactive performance	Participant description of outcomes	1	1	Either longer kind of atmospheric pieces, meaning that I would be in a space where something else was going on, like either, I don't know, a show or a vernissage or like a party at a nightclub whatever whatever, and I would be kind of doing a piece that was for several hours, often interactive. A lot of my performance work is interactive. But it wasn't like, here's a show, I'm up

				on a stage, there's a beginning, middle, and end and it's done. A lot of my performance work works with ritual and that and kind of ritualized framing. Most of it is about sexuality or intimacy, gender and shame.
Sadie/concept, ritual, and symbolism	Participant discussion of themes in work	1	1	I guess a lot of it is about kind of... finding a concept, and a lot of it's about symbolism. Symbolism of the props that I use, or the way that I have a costume or present myself, and then finding a concept and then kind of like enacting that within the frame of a ritual or something kind of ritualistic like that. But there's always variations as well.
Sadie/deadline-focused practice	Participant description of process	1	1	It's very diverse I would say, because I work in a lot of different media and it depends what medium I'm working in. For visual art, I would say that most of practice in any media is not so much what I would like, which is like a regular standalone routine for it's own sake, but more like a la carte per order thing. Meaning that I'm making pieces more for a specific end, usually an event, rather than just I have a regular routine, a daily practice or whatever, like a practice I'm engaging in and then there's a show or something like that and I take from what I've already been doing... So. I think a lot of my practice is kind of deadline-focused, which is super stressful.
Sadie/good sense but struggle technically with video	Participant description of aspect of practice	1	1	It's really not an intuitive way for me to work, but I think I have a strong intuition for image creating and the pace of video making, and it just sucks for me that digital interface is how you make that happen. You know what I mean? So it's like this funny thing where I feel pretty strong and good about my ability, the timing and the choices and all of that, and how to put together visual imagery and sound and things like that. I feel pretty good about that with video making. But the actual technical interface, I'm an idiot, and it's a big struggle and a funny thing. It also means that footage, proper lighting for camera to make a specific image a certain way is beyond my abilities
Sadie/having space	Participant description of preference	1	1	I mean I've had a dream for at least ten years of like, the thing where I have a space, and now I have a space which is great, but this has only been two years that I've had an external space to do artwork, like out of my home or whatever. Where I have a space and I just have like, hours I go there everyday or four times a week or whatever and I just work on what I'm working on.
Sadie/interactive fluid exchange	Participant description of aspect of practice	1	1	But it's very very often interactive with the audience. Sometimes there involves, like fluid exchange, like I did different things with breast milk for the time that I was lactating. So like I did a milk bar, I also did a performance where at the end of it I put milk into like little shot glasses and handed it out to the audience...

Sadie/performance work took over because it's deadline focused	Participant description of pattern in practice	1	1	When I say 'I do', it's more like 'I've done', because my performance art work really took over most, and I honestly think it's because of deadline, with performance it tends to be like you get booked for your performance and then you have to make your performance, like the performance has to happen because there's an audience and an event and whatever, and when you're used to working with that kind of stress on demand function, it's hard to make space for the more day by day meditative practice of doing visual work, at least for me.
Sadie/performance, solo and with collaborators	Participant description of aspect of practice	1	1	Yeah. I mostly do solo performances, but sometimes I do work with collaborators, usually one collaborator but occasionally I've done groups, and I mean, it's changed a lot. I don't do performance work the way I used to anymore.
Sadie/recording self while performing	Participant description of aspect of practice	1	1	In some of my videos I hold the camera while I'm performing, which is interesting, like having sex holding the camera on the sex that I'm having at the same time. My video Egg is like that, for instance. What were we talking about? I started talking about videos.
Sadie/ silent performances	Participant description of pattern in practice	1	2	And a lot of it has been silent, although sometimes, I talk, and when I talk, it's kind of like... occasionally I have a text for performances, but generally it's like either I do silent not dance but kind of movement-based, ritual things, or I talk in more of like a conversational tone. But with my own work it, and maybe also part of the fact that I don't speak a lot in my own performances is because the places that I had to do it was like a nightclub or a bar or a... you know? Something where there's... It's not really conducive to, it's not like a theatre where people go to...
Sadie/spent many years focusing on performance	Participant description of aspect of practice	1	1	But in this case, and I think it's a lot because I spent so many years focused on performance-based work. It's really like most of my art is per order, so when there's a thing to have it be shown, then I make stuff for that thing.
Sadie/technical decisions guided by capabilities	Participant description of pattern in practice	1	1	So I work in a way that I know that, and I'll use for example natural light because it appeals to my aesthetics without having to know exactly what I'm doing camera wise.
Sadie/wanting more collaboration and visual art	Participant description of preference	1	1	I think in performance I need now a bit of like bigger deeper pieces and collaboration, which I didn't used to, and I'm really looking forward more to the kind of like... lack of build-up and stress around creating visual art, where it's like getting into the zone. As far as the actual making of something goes, and I miss that, and think that's what I need more in my life right now.
Soofiya/book of anger, personal project	Participant discussion of themes in work	1	1	So that would be the book of anger, and some of those would be these cards. And so these are the ones that are left over, these are gonna be in this. And

				so, yeah, then there's a talisman as well to go with it. That you can carry around, this is your anger talisman. And potentially it could lead to other books, so there's a book of anger and there's also the book of healing, there's also the book of joy, pettiness or whatever. And, so its building all of this up. Oh, the book of bitterness.
Soofiya/client brief, brainstorming	Participant description of primary process in work	1	1	So, I get the brief in. I have a think. I make some notes. And I generally, for a client I tend to get a sheet of layout paper, pencil and sketch it off that. So a lot of them are small thumbnails. And its just a case of me visually brainstorming again. Visually putting stuff down.
Soofiya/design is how they process the world	Participant description of identification with primary material	1	1	Like, I don't know how I'd see the world, or who I'd be if I didn't think like a designer. I think its ... yeah, I think it sounds a bit likely but like, its true. Like I think, I dunno, its somehow in your DNA , like this is how I process the world. Its everything. I dunno. I don't know what I'd do without it, but yeah. Its my best relationship.
Soofiya/designing their way out of problems	Participant description of aspect of practice	1	1	I suppose its like the work ethic or whatever, its so transferable. I think like, you know, give me anything and I'll design my way out of it. Yeah, its about designing the way out of problems and like a problem solving thought process.
Soofiya/division between personal and commercial graphic design work	Participant description of aspect of practice	1	1	Okay. So, I'm a graphic designer. So, I suppose I have two different processes. One which is the client's, the other which is a personal one.
Soofiya/process of client work	Participant description of process	1	1	That's a really condensed version of how it works. But a lot of the focus for me I guess is in the early stages of what is this gonna be, how is this gonna work, what is it gonna look like, what's the idea, what's the concept in terms of visually communicating. So, I do my sketches. I have a couple of clients that I go to, so for me like colour is really important and like in terms of the way I work and the way I use them. I'm very into those things so I spent a lot of time choosing the palette, choosing ... yeah, just a really solid palette. Sometimes I like to be minimal. Sometimes I like to go all out and go, all of them.
Soofiya/style depends on client and brief	Participant description of fixed process repeated in work	1	1	So, I do my sketches. I have a couple of clients that I go to, so for me like colour is really important and like in terms of the way I work and the way I use them. I'm very into those things so I spent a lot of time choosing the palette, choosing ... yeah, just a really solid palette. Sometimes I like to be minimal. Sometimes I like to go all out and go, all of them.

Soofiya/using anger and feeling as inspiration for personal work	Participant description of pattern in practice	1	1	So, generally when it comes to personal work and my stuff, I use it process something else. And something I'm angry about, something I'm feeling at the time. So, there's, I did a scene about menstruation. And so, I was just really annoyed about my period, and that was enough. And that led to me to process something and kind of, just through work, and through a design.
Soofiya/using the noun project as inspiration	Participant description of pattern in practice	1	1	I use the Noun Project a lot. Sort of like a visual thesaurus just to get an idea of what sort of imagery I can use for this. So, if I'm doing a project, I'm doing a project at the moment about DIY knowledge. I got some feedback, they weren't feeling it, so I need to get back to the drawing board. So, I was thinking about I'm going to Noun Project and type in 'knowledge' and just see what comes up initially.
Soofiya/using whichever tool makes sense	Participant description of preference	1	1	And so I use Illustrator, InDesign, Photoshop. And generally, I stick ... I jump between Illustrator and InDesign. Illustrator is great for vectors, vectors are great for shapes. So, I tend to build in the illustration the imagery and go from there. InDesign is fantastic for layout. So, I mostly do my images, do my illustrations, do whatever. Then take them on to InDesign do my layout and processing like this in the project.
Soofiya/what's the concept to be communicated	Participant description of fixed process repeated in work	1	1	But a lot of the focus for me I guess is in the early stages of what is this gonna be, how is this gonna work, what is it gonna look like, what's the idea, what's the concept in terms of visually communicating.

Intuiting or Thinking About Steps/ Child Codes	Description	Sources	References	Example
Able to work more intuitively because of years of practice	Description of perceived reasoning for capabilities and process	1	1	Generally I think, after years in my design process, it comes naturally. So, the design process, once you've got your head around it you can cut out steps and you can sort of jump to where you need to.
Associating teachers with specific steps	Method of remembering steps	1	1	And then after that there's little things that I always have to remember, to compress the bottom when I'm throwing it, and it's interesting, when I think about these steps I always think about this. I remember distinctly the different teachers that taught me to do the different steps or like even friends who taught me to do a trick or reminded me how to do something. And I still remember those people as I'm doing those steps, which I really love because I've had so many different teachers and that's like an important part of I guess my ceramic practice is how many different people I've learned from and like collected things from so, yeah.
Conceive of piece first and then think of steps to execute it	Description of process	1	1	So, I think of something and before I actually start working on it, I definitely think through how I, or what I need to do beforehand. Cos, for example, if you like a box and you build it and you seal it and, actually there should go a ball inside of it, then of course you have to take everything apart again and put the ball in and then close it. It would make way more sense to first have all the sides ready and then you put the ball in and then you close it and then you are finished.
Easier to assess own safety than that of others	Description of perceived reasoning for capabilities and process	1	1	if someone else is tying me up, they can only assess my pain limit and they have to work with that, with my input, along with my input, it's not like I lay down and tell them only at the last minute. But I usually, in certain difficult positions, not in playing but in practicing especially, but also in playing, I like to give input in the way that it makes sense because it's a ... the physical limitation of it concerns the health risks in those pain terms. But the uh... when I'm tying myself up, I'm better at assessing that so because I'm hurting myself I can make that pain, I can choose to make that pain go away in a

				safer way. I know the exact limit.
Intuitive unless there's a practical reason to follow a formula	Description of process	1	1	I think it flows more intuitively. I think there's some things that, depending on the material, you have to follow a certain formula for it to work. Sort of like, for things to be activated. SO those are practical, formalist things you just have to do. But more or less it's intuitive, like the more abstract sculptural stuff that I make, and that's more intuitive. The shapes they evolve into, the structures in all of that and the color palette. The more formal stuff is quite intuitive once I get started.
Make list of steps and shopping list for materials	Description of process	1	1	But, so yeah, when I start to work on a piece I definitely think beforehand what I need for it and how I approach it. Also, I really don't like to go to the hardware store or whatever store for 20 times because then, okay, now I need to paint, and then I need the concrete, and then I need maybe a string or something. So, I make lists and like a shopping list, or also a, yeah a material list, or also a step by step list, what I need. Maybe when if it's a bigger thing, then I maybe just don't have the space to get everything right away. So, I most definitely like think from step 1 to step 20 if that's the end.
Needing to work in steps for piece to come out	Description of process	3	3	So I would say the first step is wedging your clay, that's before it even touches the wheel, you have to... It's like kneading dough. You knead your ball of clay until... You want to do it for at least three minutes because you want to make sure all the air is out. You want to make sure it's a good consistency and you're packing in the particles and making it like tight. So that's the first really important step and then you have to decide how much weight-wise you need for what you're going to make. So like a mug would be like anywhere from 1 lb to 2 lbs and then something bigger would be more and you just have to have an idea in your mind of how much you're going to need. And then getting it on the wheel, the first step and usually the hardest step is centring the clay and making sure that it feels like it's almost not moving while it's spinning really quickly on the wheel. And then you open up the clay which is, I'll show you, and then you can start making your form.

Safety Concerns if steps aren't followed	Description of perceived reasoning for capabilities and process	1	2	Well, there is of course the main thing is there are safety concerns, like you have to do certain things to be able to hang someone up, and if you do it in any other way that puts them... I mean there are different ways to do that but if you do it out of any one of those ways you put them into a risk that... I don't feel comfortable with because I wouldn't want anyone to be putting me in a risk. And that's why I follow that certain harnesses have certain ways of making, you cannot make them any other way around, you have to have a different harness to accommodate that person, which I'm more than happy to do.
Starting with a skeleton and fill in during the process	Description of process	3	4	So then I kind of create a score, and depending upon what is available for the rest of the process, like is there time and resources for rehearsal, is that me in my room, is there a space where it's going to be done, etcetera etcetera. Then it varies how set the whole thing, talking about performance now, is before I perform it. But there is generally always some space. I tend to work with a strong frame or skeleton with space in between, and that's probably true for most of my work. But I don't usually dive into things just being open to whatever. I'm too thinky to deal with just following the muse or whatever. Even when I paint things and I work on the painting for awhile, I tend to make notes and think oh yeah, this color thing or whatever. I work a lot with notes and lists, in all of my creative endeavours, writing also.
The steps vary by material	Description of perceived reasoning for capabilities and process	1	1	So, I can sort of jump on the steps of anything around Photoshop which I used before on something. If I want it to be illustrated I know I need to start, that needs to be completely ... I know I need to use these effects in Photoshop, I need to do this part by hand, and use a drawing tablet, or do whatever. So, it's a whole different process. I need to know what flavour to look for. So, I know what ingredients I'm using and then I can sort of put them together.
Manipulating Materials/ Child Codes	Description	Sources	References	Example
Bending rigid, plastic	Description of manipulation	1	1	Yeah, and let's see, a lot of the past sculptural work I've been doing has

materials organically				been using a lot of acrylic glass, plexiglass, and there's a lot of manipulation in that. So there's manipulation in bending and shaping and trying to take this like rigid material and make it as fluid and organic as possible. It's like one of the most inorganic materials, you know, plastic, like it's one of the most inorganic materials that we have. It's like it's constantly trying to mimic the organic world in that way.
Caring for the ropes	Description of manipulation	1	1	Oh, so maybe in two senses. One is that these ropes have their own materiality, so you have to work with them, you have to treat them, you have to burn them, you have to put some, maybe sometimes you have to boil them, you have to put some baby cream or jojoba oil on them.
Collecting catalogue of textures digitally	Description of manipulation	1	1	I used to use textures quite a lot. So, I had my ... so, I had my file where I just, start this over, stuff like this where I scan in materials. Some of it might lead into like the background of something. Some of it I never used. Some of it is just there. But its just nice to have that stock about. And I also stock for, I suppose, backgrounds and background textures. EPS files, which I just sort of collected over the years. The icons. The, I dunno, a map of Europe or whatever. I don't use them daily, but occasionally there might be something. There might be the odd job that comes in so, its sort of building up a literal catalogue, a visual catalogue and all of these kind of resources that I can just pull in somewhere.
Controlling quality of concrete by mixing it	Description of manipulation	1	1	So, thinking about concrete for example, or plaster, I guess I buy the raw material which is just either some powder, or dusty stuff, or sandy stuff, or with the concrete it varies. And grip I guess too. And then I transform it by adding water to it and this makes it very fragile as well, because I, at least needed a lot of experimenting to find the right water amount that I add. Or, also with concrete, you mix cement with the sand and the water, and then, what depends on how you like your ... you would like to have your final product, how soft it should be, or yeah, or not. You just vary the measurements I guess.
Creating emotional and physical sensations on the body	Description of manipulation	1	1	It can also be an emotional manipulation, especially depending on what the people who are being tied up or doing the tying, how they feel that they want to interact with those emotions.
Digital process	Method of manipulation	1	1	My process is normally digital. So, I use it Adobe and Adobe Suite. I focus a lot on Illustrator, InDesign and Photoshop. And how I process that sometimes is purely to choice and purely just things like the shapes built in Illustrator.
Drawing, carving, rolling,	Description of manipulation	1	1	For linoleum cuts, I have to carve, like I carve, draw on and then I carve a

printing linocut				sheet of linoleum, I have a chisel and I take long shreds of linoleum out. And then, I have this block and I roll on ink and then I print it. So that's a lot of different physical manipulation of materials.
Gold lustre	Method of manipulation, highlighting shape	1	1	Yeah, and then I use gold lustre on my work and I'd say that's about it.
Manipulating environment with the body	Method of manipulation	1	1	And now what else could I say. Ah, yeah, maybe, I'm thinking of a couple of pieces I did. For one video piece, I again, transformed maybe myself and my surroundings because I undressed on Tempelhöfer Feld, this huge park in Berlin. And it was winter-time and the snow was lying. So, I got naked and I guess I transformed my body because I took off my clothes. But I also transformed the surrounding because of the warmth of my body, the snow melted a little bit. And, but the snow, or the weather itself was so cold that I transformed myself, because I just dropped a couple of grade ... not grades ... Celsius, degrees.
Manipulating the body with materials, manipulating materials with the body	Method of manipulation	1	1	So, I guess with, I did once a performance where I wore a white morph suit and I sewed in magnets. And, then it was during an exhibition of friends and acquaintances of mine, who build sculptures out of steel or metal in general. So, my performance was walking around, dancing and interacting with those sculptures, but being always like stuck to them also. So, that's how I kind of manipulated the ... my body as being also a material and the costume I wore. And because of one, some sculptures were a bit lighter, so also their positions were manipulated in this situation.
manipulating the body with the environment	Method of manipulation	1	1	And, yeah, I thought I would die, just because I was out there for 40 minutes. So, it was quite crazy. A self experience I guess.
Manipulations are about camouflaging one material as another	Reason for manipulation	1	1	Like everything, every material I use, it's about me trying to transform it so that it appears to be something else. So it's not even that, and again, that goes back to this idea of the synthetic versus the natural and the appearance of like, sort of the idea of camouflaging. So I use this a lot either aesthetically or also when I'm contextualizing my work so when I'm manipulating material it's always about camouflaging material, like how close to the real thing can I get.
Materials are deeply connected to concept and process	Reason for manipulation	1	1	And then I think, how can I work with materials to make this idea happen. So, I had this idea about I had a relationship to process. and I thought about, yeah, being torn to somebody, or yeah attracted to somebody, but in the end because it wouldn't work how it is also, yeah pushing you away.
Negotiating terminology and implied power	Description of manipulation	1	2	And I consciously avoided the words like 'rope bottom' 'rigger' 'model' 'rope top' 'dominant' 'submissive' because I think those are words that

dynamics				should be negotiated in terms of how people feel about what they're doing in a partner setting, and I do consider myself as tying myself up, and when I'm tying other people up, depending on my sensation with them, they're not necessarily my 'submissives' or my 'bottoms', they might be people I'm exchanging rope sensations with on a more equal basis than that. So yeah, I just wanted to note that. Most people will be like the Big Riggers or whatever. I'm not sure if that is a word I would use for myself. I do rigging, though, so.
Physically manipulating elements of the body	Description of manipulation	1	1	It definitely does, on a physical level you can see that their bodies are restricted, their muscles, their nerves, the body elements of the body are also positioned in such a way that it creates a different sensory level, different bodily sensations.
Picking up residue from creation process	Description of manipulation	1	1	And it was, the exhibition was in the workshop of the people who made the sculptures. So, a lot of iron dust or steel dust was still lying around. So, wherever I had the magnets, I in the end had just black dots because especially those spots took the dirt in the end. So, that transforms it and manipulates.
pouring liquid clay	Method of manipulation	1	1	And so then for the slip casting I use a liquid clay and I use different colours.
pressing on paper itself rather than the board	Description of manipulation	1	1	And I also tend to put the paper on top of the board and press from the paper, instead of pressing down from the board, because the pressure is better if it's not going through the thickness of the board.
process of manipulation is the art, the photos stand apart as documentation	Distinction between manipulation and art	1	1	So, I also put the material inside of me in the end. But if you would say, the art piece is only the picture then its something different I guess. Because the picture is then standing apart from it. And its just about the aesthetics and the meaning that the title gives it. And yeah, so I'm not eating the picture, so its not, you could say, the art is not inside of me, but maybe the process, how I ate the fruit.
process of printing and carving and mistakes are visible	Method of manipulation	1	1	Whereas the chiseling is also a bit hit or miss because you can always slip and make a mistake and when you make a mistake it's done, it's not like painting where you can paint over and it's like invisible, it's either you make a mistake and the piece is fucked or you're working with the mistake as a part, so that's kind of... the stressful part, but also the carving is very... like besides the act of slipping, the carving is very much regular, whereas the printing is like... at least for me, I don't know what's going to come about, and which prints will work better and what I'll like, and a lot of that is about the pressure. And I also tend to put the paper on top of the board and press

				from the paper, instead of pressing down from the board, because the pressure is better if it's not going through the thickness of the board.
satisfying, quick, colourful, surprising, cheap output	Results of manipulation	1	3	It's like a really old school photocopier. It sort of works on a stencil principle and level textured. And there's some really nice like common stuff, really DIY and quite economical because the more you print, the better. But I really like the process because the ink colors you're getting on the riso, you can get gold, black... So, I think in terms of outputs its really satisfying. It's very quick. It's a bit temperamental. It has a mind of its own. And I really like that and working with it.
Sensitivity to the body as material	Description of manipulation	1	1	And it is a tiring process to be tied up, so you have like... especially in suspensions it is stressful on the body, your hands might fall asleep in certain positions, and you have to like... as the person who's tying, you have to be keeping that in mind so that weight levels on the shoulders and on the hands change so that the hands don't fall asleep in the same position. The person who's being tied up, they have to be aware of their body's responses to certain positions and whether or not they're safe in the sense of permanent nerve damage.
slip casting and mould making	method of manipulation	1	1	then I do slip casting which involves having a prototype, usually something that I throw on the wheel and then making a mould out of it so I use plaster and I've become very good at making moulds and it's part of my practice now
specific materials for suspension	method of manipulation	1	1	So you work with the material, but then you also work with different materials, so there's rings for suspension or carabiners again for making suspensions easier, but you could also do it obviously without carabiners. So that kind of, those add to the material aspect as well.
taking inspiration from client projects and using them in personal work	method of manipulation	1	1	So, then I started off just doing that as part of like a pattern project, but then it led to something that almost like a projection of something I'd seen first. So, it was like looking around, and that was a sticker and stuff. Right. And then again, this was for a client, Gendered Intelligence. That process of learning how to make these led to this. And then this led on to some of the anger stuff that I'm working with that I showed you earlier, the future is this, the whole nurturing and whatever.
taking the function out of objects used in pieces	Results of manipulation	1	1	Also, I take out all of the functionality of the real. So an example would be, from one of my past recent exhibitions, would be a synthetic plant that I manipulated and painted and put patterning on top and created it in a way where it seemed like a real plant. I can send you a photo of this afterwards for reference if you want, but I did these C-clamps, which are typically

				these... it's like a functional tool that's meant to hold things together on a very basic level, and what I did was make a bunch of resin casts of them, which then makes them unfunctional. It's not serving any purpose, the plant's not serving any purpose, it's not like growing, it's not like helping the environment or anything like that, it just has it's aesthetic appearance.
talking to material when working with it	process of manipulation	1	2	I think that especially ... I don't know if I do this with performance but visual, video things where there's a specific object or material that I have to manipulate, I think I talk to it a lot. Especially when I'm frustrated. But like, sometimes also with praise, where I'm like 'ooh, that was a good one'.
the audience as material to be manipulated	description of manipulation	1	2	I work with involving audiences sometimes in the ... now mostly when I do stuff on the street or outside, or when I do it with strangers, so I guess I also, I take them out of their comfort zone and confront them with things. Which for me, is like a task to make them think about things they wouldn't rather think about, or in ways they wouldn't think about. So, I guess maybe, I transform the material audience.
throwing on the wheel	method of manipulation	1	1	I throw a lot of pottery, so that's like throwing clay and the wheel
trying new materials as training a new sport	description of manipulation	1	2	Again, I think that goes to part of building up this visual catalogue that I've got. So, for me its just, its sort of like when you're an athlete and you're training, for me its just training. It's not my final race that I'm running. I'm in general considering client in the case it's just a matter of going out for a swim or going out for a jog or something like that, which I think the linocutting is, or maybe going out on a screenprinting course, or trying a new material for a day. Or something like that, where its just keeping those kind of just fresh and just working on it.
unexpected interactions between materials in performance	description of manipulation	1	1	Thinking about the magnets, plus and minus opposites, and also one sculpture was just made out of spikes, out of steel spikes. And that was also a part where I hugged this bear and definitely had the spikes on my skin also, but the magnets they didn't let me go. And in the end also the fabric didn't let me go because it all was intertwined. So, this, I guess concerning the performance or costume part.
using body and found object to rub and make prints	method of manipulation	1	1	Yeah yeah definitely. And actually, one thing that has been advised to me that I've never done... like if you're doing linoleum prints on like a professional level, you have a press so that the pressure is firm and even, and I've never done that. So I actually do it where I put the paper on, press it with my hand as much as possible, and then I have something heavy which usually has kind of a rounded bottom, like a jar that's full of something for instance, and then I like in circles tend to rub rub rub rub

				rub, and then more with my hand, but it's actually very physical, and very... It like, making the linoleum is the first part, it's a very discrete part from making the prints. And the prints are way more experimental because of the pressure, actually. Like is like, is the ink the right layer and thickness on the block, and how even can you make the pressure.
using one material she loves the most in different ways	method of manipulation, throwing, slip casting, etc.	1	1	Oh yeah, I've done all sorts of other stuff but right now I'm really just doing clay because that's what I am, what I love.
using one material to clarify work in another when stuck	reason for manipulation	1	1	So, I keep it coming forward. If I'm really stuck doing digital work, I like to clarify it and go pick like a screenprint. I used this image, and like, cut this out, and I was awful at it. It was great. I enjoyed the process. And yeah. Any questions at all.
using wooden tools	method of manipulation	1	1	I throw a lot of pottery, so that's like throwing clay and the wheel and different like little wooden tools and then I do slip casting which involves having a prototype,
variation and record of circular movements	description of manipulation	1	1	Yeah and it's like ... and then you like, mixing from going up and down to a lot of circles with both my hand and something heavy. A lot of attention to the corners, because that often solidifies the piece, like if the corners are well-printed, variations in the middle are easier to... yeah.
Most Important Skill/ Child Codes	Description	Sources	References	Example
Most important skill is foundational skill, otherwise others don't matter	Most important skill	2	2	I want to say wedging, like really the first step... because if you have a bunch of bubbles in your clay, if you don't wedge it well enough, everything you make is going to be trash. So that is really the first and most important
Most important skill is a versatile skill	Most important skill	1	1	I mean also painting is a huge part of camouflaging and manipulating materials, through paint in general. It's a huge thing. Manipulation of like, how you use colour, colour theory. Within paint itself, you can make wood look like marble or vice versa and those are very... they're not necessarily basic tools but they are the fundamental tools that are there that every artist starts off with.
Most important skill is also useful in everyday life	Most important skill	1	2	Like just on a very basic level, like be able to use like power tools and build stuff is quite important. It's a universal tool that is necessary for, yeah, even everyday stuff.
Most important skill is building skills from	Most important skill	1	1	But then I worked as an art model for colleges for a number of years, so certain things I picked up from there. Basically I feel like I got the basics of

different sources				most of the stuff I do in middle school and high school and then I've never had that much formal training on top of that. I've just been somewhat autodidactic. I did take a really good performance intensive one time, that really I feel like strengthened my performance work with La Pocha Nostra and Guillermo Gomez Peña and that was like a two week thing.
Most important skill is knowing to use a tool for what it is for	Most important skill	1	1	I think just treating it as a tool, which it is and not being as intimidated as ... My students love doing stuff by hand. They're very comfortable and some of them then get really intimidated by the software, and don't use it ... Or they use it, but they use it just to mimic that. And I'm like, this is a great tool for something else and realizing the beauty of the tool. What its used for. So for Photoshop, I use it for editing photos. I won't use it for type, I won't use it for my ad. Because that's not what the tool was designed for. Indesign is great for that. Great for grids, great for like, block type setting. So, I use the tool for what its designed for. I wouldn't use a paint brush to write my name on a form. Its that kind of ethos and spirit I think.
Most important skill is respecting the material	Most important skill	1	1	To kind of respect the material to approach it with maybe logic and mathematics. Like when you mix the powder of plaster and water, then its just a 50/50 thing usually. But sometimes, you know, it varies. And with concrete even more complex, because you use three compounds, or if you wanna put something into the concrete you need more. So, just yeah, you be slower with it. Yeah, and patiently slow and try things out and not force things.
Most important skill is skill without which practice is dangerous	Most important skill	1	1	I think for me the most important skill was for me to learn to be able to communicate what and how certain things feel, like precisely when I have my hands at the back and when they're tied up and when there's pressure on my shoulders my hands start falling asleep. It was really important for me to learn to communicate when that pain, when that numbness or the bite-y feeling, when that was nerval damage and not just... okay... so I had to learn to communicate that was.. or like which body parts hurt, it's not just like oh my body hurts, it's like 'my toe on the right foot hurts a little' because maybe, you know, check up on that.
Most important skill is spending time with practice every day	Most important skill	1	1	Even on the days when I'm not designing its still always in the background. Every day I thinking about this. I think I have a better relationship with this than I do with any human being in my life.
Most important skill is taking materials from any environment and making	Most important skill	1	1	It takes.. you don't need a lot, and I think that's also really important to my practice, using the scraps of whatever is in your own environment. I've moved a lot in the past few years and each place that I've been living and

something				working in will always influence my work, and that's also part of my work, is extracting from the environment that I'm in and it's providing me, and seeing how I can manipulate that material in whatever way that I need it to be.
Process/ Child Codes	Description	Sources	References	Example
clarity about endpoint with client work	Description of process aspect	1	7	So, I get the brief in. I have a think. I make some notes. And I generally, for a client I tend to get a sheet of layout paper, pencil and sketch it off that. So a lot of them are small thumbnails. And its just a case of me visually brainstorming again. Visually putting stuff down.
client needs a specific thing, personal work is content driven	""	1	1	Again, like its if its client work, there's always an outcome in mind. If it's personal work, generally I like that there's something I just work on. Sometimes like patterns, I just start doing them, there's no outcome yet, they're still in the process. And that's okay. There might never be an outcome. And I think that process is fine for that.
client work and designs can inspire personal work	""	1	1	And then again, this was for a client, Gendered Intelligence. That process of learning how to make these led to this. And then this led on to some of the anger stuff that I'm working with that I showed you earlier, the future is this, the whole nurturing and whatever.
downtime is necessary for ideas to evolve	""	1	1	So having that sort of downtime in that way is necessary for the larger project proposals at the end of the day.
flashes of inspiration and experimentation	""	1	1	So, I had form where once I bought a dildo and it was delivered in a beautiful plastic form, and I used the form to make plaster and concrete dildos out of it. And then, I thought about okay, what can I do with it. So, that was the start of my experimenting with the material, and, but I didn't wanna just throw it away, so I thought okay, I could make an installation sculpture out of it.
going through phases with different processes and materials	""	1	1	Yeah, and what else. Yeah, I mean sometimes I have like areas I'm interested in. So, I was really into doing, I dunno, like so its hand drawn stuff, like letter press, but then I kind of got more about vector line stuff and I'm really to this sort of stuff. And then tomorrow I'll be into something, so I think, so right now I wanna do more of this, so that's what I'm continuing with.
ideas develop through talking with other people	""	1	1	So, my process then would definitely develop organically and also through talking with other people about my ideas. And then maybe they would think of something I haven't thought about yet. And, so the sugar cubes actually

				started out as wood cubes, but that didn't make sense in another way because it wouldn't fade away enough. It would maybe just fall, but in the end, I could like pack it and go away again. But I wanted it to stay there and just, yeah, dissolve on the grounds, and maybe have also a little bit of an after effect when people would walk by and see a little sugar tower and just wonder what it is, yeah.
intuitive process of figuring out when personal work is finished	""	1	1	Generally when something's finished if its on my website and its got its own, like, little square, and its printed and its done. That's my mark of the finish. If it doesn't exist on here, its still in process, its still kind of being worked with. For me, that marker is, is it published, does it exist in the world, and outcome. So, there are projects that exist in just like, just on my computer. They don't have a link anywhere. So, then for me, they're not finished because I go back to them and just tweak them. Whereas here, I can't really tweak them anymore once they are there. Which is nice, I think for me, that's what builds up or whatever.
notes as skeleton	""	1	1	So then I kind of create a score, and depending upon what is available for the rest of the process, like is there time and resources for rehearsal, is that me in my room, is there a space where it's going to be done, etcetera etcetera. Then it varies how set the whole thing, talking about performance now, is before I perform it. But there is generally always some space. I tend to work with a strong frame or skeleton with space in between, and that's probably true for most of my work.
one part requires control, one part is very intuitive	""	1	1	Well I love what I'm doing right now because I have to give up a certain amount of control. Some part of it is very controlled, like the prototypes have to be perfect. I have to control that 100%. The moulds have to be perfect. The slip has to be in very good condition and it needs to be the correct thickness. But then... KHN: For it to even work right? BD: Yeah, for it to work but then I give up all control when I'm actually making the pieces themselves, slip casting, and I really love that part because I feel like I really don't enjoy hand decorating stuff and the way I'm doing things now is it does it for me.
opportunities to intuit and experience serendipity within controlled processes	""	1	1	And I think the nice thing about throwing is that you have an idea in mind but just the slightest change of the top of the piece, like if it goes in a little bit instead of going straight up or like the bottom, if you just change it a little bit, it makes it into a completely different thing and I really love playing with form so the wheel is really... It's a really great place to just like practice that, finding the perfect form.

personal projects start with process and then go back and forth	""	1	2	With personal projects, sometimes the brief is a bit loose. So, its less like, this content and this here. A lot of them sort of make themselves. Often I start with the subject matter. I start with my idea of something that I'll work on. I tend to start by designing first as opposed to processing thinking, and then I jump between the two.
process of going back and forth with clients	""	1	1	My feedback, that comes back with 21 changes and I would like get tweaks and there might be a bit of jumping back and forth. And eventually be at the stage where we're like, right we're happy with it, and I export it as a PPD file and sort of then I can tick it off.
purpose-driven process	""	1	1	But now when I'm throwing, like sometimes I'll throw just like for fun, for myself, but I've lately been throwing with a very directed reason, like I need this mug to be perfect for this prototype because it's going to make like 300 mugs...
researching and then taking time to intuit	""	3	4	Well my work is very much research-based, so I think like I start off with the idea, and then from there kind of I think intuitively the materials come about. So it's a combination of both, some stuff is planned out and constructed in a way I visualize because I'm creating an environment so I plan out like how the space will look, but in the process of doing that there's lots of things that just naturally float in by themselves, and... in the making, in the process, all the dots start to get connected but it's quite intuitive. It's hard to explain, but in the back of my head already some of the things I would gravitate to those things because I knew subconsciously that were connected or something like that, and this for me is actually one of the most fulfilling parts of my practice when these moments happen because yeah, it just happens naturally, and, in a non sort of -romantic way, it's a very beautiful thing that happens in that way, when those things sort of evolve naturally by themselves.
skeleton of plans, rest is intuited	""	2	2	I tend to work with a strong frame or skeleton with space in between, and that's probably true for most of my work.
start with message but body has to be okay with it	""	1	1	I think for me, since performance is an art, it is a mental process, and I think of an image or a message I want to give to people, and I also... but this is a body performance, it is something I create on myself, so it has to also feel okay in the larger sense of the word okay. I can't do it for the message, it has to come from me and my body to give the message in this format.
starting with the concept and what it looks like is	""	2	3	But its, I see that when I start like this my final idea is not as fixed or thought through, well thought through as when I start with the idea and

intuitive				then walk the way to get to the end result. And when I have an idea and I have like a, okay, something I want to ... a message, I want to bring out there for people to hear about, then I usually think, okay, how can I make this happen.
The Unexpected/Child Codes	Description	Sources	References	Example
Changing plans when it doesn't work out	Participant adapts practice to unexpected results	1	2	Sometimes things come up because something doesn't work as I planned it to be working. But, yeah, I definitely think more in advance.
Choosing material for ambiguity	Participant chooses material and form of expression for ambiguity it creates	1	1	And I really like morph suits a lot, so I, because it has this anonymity and a very nice beautiful texture, and if you, yeah if you maybe also hide your breasts, or move in a certain way, its also very gender ambiguous.
Collecting textures for inspiration	Participant has created texture library digitally for inspiration	1	1	So, that was the idea, and then, I dunno, one day, I started by collecting stuff just in life in general. So, like maybe I see something I like and I copy it, maybe a nice texture. And so that kind of visual cabinet just exists. And then I dunno 10 years from now or like five days, I'd be like, oh yeah, okay. And then it just clicks together.
Discovering new ways of doing things	Participant discovers new viable outcome because of feeling in the moment	1	2	But I did modify a chest harness for myself once because I wanted it tight once I was in the air and I didn't deal with the rest of the... it was a two part harness just on my chest. I just tied my breasts up and put the pressure on my chest and didn't think about the shoulder part because I didn't feel like it in that moment, which was fine, so. It turns out that it's just also the length of the harness.
Ease of experimentation when you don't know the 'right' way	Participant feels more able to experiment where they know less about the 'rules'	1	1	There's more room to be experimental but nobody taught me how to do this shit, I just have been paying attention and figuring out what works for me. Whereas with performance, that's a thing I think... when I moved to San Francisco I started being in plays a lot and little local community theatre, mostly ridiculous plays but still fun and I was in rehearsal often and blah blah blah, and I think theatre and performance is probably where I feel like I've had the most concrete training but then it makes me feel incredibly pressured because it's clear that there's a right way and a wrong way and I need to be good rather than 'eh let's just try this out'.
Easily trying small changes	Participant making a small change and feeling inspired; material facilitates changes based on limited effort	1	1	And I think the nice thing about throwing is that you have an idea in mind but just the slightest change of the top of the piece, like if it goes in a little bit instead of going straight up or like the bottom, if you just change it a little bit, it makes it into a completely different thing and I really love playing with form so the wheel is really... It's a really great place to just like practice that, finding the perfect form. There really is no such thing as the

				perfect form but like really testing what looks good and what works and what doesn't because it's just the slightest difference that makes a piece go from 'Oh that's nice' to like 'Wow, that's a great shape'. It can just be the littlest change, which I love.
Enjoying experimentation	Enjoying and choosing materials because they allow for experimentation and low-stakes engagement	2	2	Another medium I forgot to mention that I work in is crochet, this is again the hand-based medium and I do a lot of... I don't know how to do, I've never crocheted with a pattern, so it's this very improvisational.. the way that I crochet. But it's really fun to have this thing where I have this image in my head and then I'm like, like the part where I never feel super skilled or very very specific or exactly professional is also kind of fun, because it's like I have this image in my head, and I'm like, okay hands! Give it a shot! You know? And then it's like figuring out in a bunch of ways.. like it always feels a little experimental. But that's fun.
Failing and learning	Failing and making mistakes or achieving unexpected results as important learning experience	1	1	In a lot of things in life, the ability to fail and learn from your failures... if you have that much control you're not really allowing yourself to take those risks and chances or evolve, and I think that for me at least, within my art practice and even within my life, it's about taking huge risks, and not being able to go back, committing to that decision and whatever the outcome is, it just is, whether you agree with it or think it's great or whatever.
Figuring out where variations work best	Tolerance for variation in some areas of piece but not others	1	1	Yeah and it's like ... and then you like, mixing from going up and down to a lot of circles with both my hand and something heavy. A lot of attention to the corners, because that often solidifies the piece, like if the corners are well-printed, variations in the middle are easier to... yeah.
Flashes of inspiration	Chasing moment of serendipity in practice	1	1	I wanna spend the rest of my life chasing the feeling of, do you know like, its lunchtime and you're still hitting your brick wall and it's hard, and just going nowhere, and you've got this block and you don't know what you're doing. And then suddenly you go for a break and you come back. And you're like, oh my god what about this. And you just move something and like everything clicks into place. And I've spent my life just chasing that little feeling, that moment there.
Giving up control	Moments of giving up control in the process of creating work and reasoning for doing so	3	5	Yeah, for it to work but then I give up all control when I'm actually making the pieces themselves, slip casting, and I really love that part because I feel like I really don't enjoy hand decorating stuff and the way I'm doing things now is it does it for me. The colours do their thing and then I get to see what it made which is great and then I get to do the finishing touches on the work but a lot is left up to chance for I guess the creative... What people would call the creative part of it, of the final piece is, I don't want to

				control it so...I do, I've learned how to get the best results but still every time it's a surprise.
Ideas float by and dots get connected	Serendipitous connection between ideas over time	1	1	I plan out like how the space will look, but in the process of doing that there's lots of things that just naturally float in by themselves, and... in the making, in the process, all the dots start to get connected
Inspiration from found objects	Using found objects or other work for inspiration in own work	3	3	I also use my phone a lot as well. So, I find a lot of illustrations and designs on Instagram. I find that's a nice ... I can Google it and find just some nice little just ... Its like having a little book right. And you can just sort of flick through just like illustrators work. Who am I following. Well I really love Janine Rewell at the moment, just beautiful colour. So, sometimes I might just take a shape or something, or something like here....
Inspiration from trying things out	Participant experiencing in the moment inspiration from seeing change	1	1	So now I'm just going to use my left hand and I'm just going to carefully really lightly push on the inside and take it out a little bit, go up and down a little bit. Just give it a little bit of a bulge. So it's not so boring. Actually so I'm going to take my rib in my left hand and I'm going to push the lip in a little bit. We're going to totally change this mug and make it rounded.
Keeping some aspects and discarding others	Using layering to achieve desired composition but keeping mistakes in order to go back if needed	1	1	So, I do my sketch all messy and then I get another sheet and lay it over the top and do another draft. And then I might do another sheet or draft and try and get to this version of like neatness. But its just a case of layering and layering it over to get to the layout I want. So, it's the main thing. If I'm working online, well its very simple work.
Leaving space for the unexpected	Having some processes that are 'for fun' or less structured, allow for play.	2	2	I think for me its more about the process than seeing the outcome. So, yeah, cats again, like working ... cos it has to be black and white when you put it into the printer. But yeah, so it's just a very nice process again. I think I ... a lot of that outside design, those projects, they sort of differ, and maybe on the weekend I just do something fun, I just make something. I've got an idea. I see something I like and I wanna do something similar or what have you. And I just pop them here. And they might lead to something so ...
Leaving unique and unexpected imprints of yourself	Choosing materials because they will never be perfect, pick up traces of their making	1	1	So in glass, for example, because of the bending and shaping of the material and the physicality of it, you can't actually replicate those things, not like to the T, and there are imprints left behind, which are fine, and that's kind of the fascinating part for me, those imprints of my touch in the materiality is important for me.
Losing yourself in the process	Balance of thinking about how the participant wants their body to look and losing themselves in the experience of	1	1	At this position, I didn't really think about it, but I'm holding this leg, so what I really prefer is like having the leg in a position that I don't have to hold, maybe this is like way nicer. But I like losing myself into the ropes.

	creation			
Low risk, easy experimentation	Using a process or material which is forgiving and allows exploration	2	2	And the more, something I love about clay also is the more that you use a single ball of clay and you make a mug and you don't like it and you smush it back and you re-wedge it, the more you do that, the better quality the clay is. And if you could keep the same like 20 lbs of clay going for a whole year to practice with, it'll just be better and better quality, which is kind of cool.
Multiple opportunities for surprise	Multiple steps in process is multiple opportunities for surprise and unexpected results and experimentation	1	1	Yeah, it's like constantly editing. I draw, and that's the first edit, and then I carve, and that's the second edit, and then the printing is the final edit. Each part of it comes out with a different result.
Not having an outcome in mind	Very structured professional process, so unstructured personal process feels good	1	1	If it's personal work, generally I like that there's something I just work on. Sometimes like patterns, I just start doing them, there's no outcome yet, they're still in the process. And that's okay. There might never be an outcome. And I think that process is fine for that.
Opportunities to incorporate experiments or mistakes	Different parts of multi-step process allow for more experimentation, particularly low-stakes experimentation, than others	1	1	It like, making the linoleum is the first part, it's a very discrete part from making the prints. And the prints are way more experimental because of the pressure, actually. Like is like, is the ink the right layer and thickness on the block, and how even can you make the pressure. Whereas the chiselling is also a bit hit or miss because you can always slip and make a mistake and when you make a mistake it's done, it's not like painting where you can paint over and it's like invisible, it's either you make a mistake and the piece is fucked or you're working with the mistake as a part, so that's kind of... the stressful part, but also the carving is very... like besides the act of slipping, the carving is very much regular, whereas the printing is like... at least for me, I don't know what's going to come about, and which prints will work better and what I'll like, and a lot of that is about the pressure. And I also tend to put the paper on top of the board and press from the paper, instead of pressing down from the board, because the pressure is better if it's not going through the thickness of the board.
Room for improvisation and concealing mistakes	Enjoys ability to experiment and make mistakes in performance without the audience's knowledge, even if she knows	1	1	It's like there's room for some improv and there's this and there's... and what that means is if I make a mistake I might get really thrown off and disoriented and feeling lost or confused within my own piece and also mad at myself or whatever. BUT, probably it's pretty often that the audience would have no idea because, unless I just stop and have a look of terror on my face..
Room for surprise in personal projects	Personal projects not fixed outcome driven	1	1	With personal projects, sometimes the brief is a bit loose. So, it's less like, this content and this here. A lot of them sort of make themselves. Often I start with the subject matter. I start with my idea of something that I'll work

				on. I tend to start by designing first as opposed to processing thinking, and then I jump between the two.
Seeing something and feeling inspired	Inspiration from things seen before or during performance which come out then	1	2	And um... other than that, I come with certain, depending on my interaction with the person, I come up with certain stuff to do to them because that is how that is triggered in me. I want to tie them up because they have this beautiful hair, so I want that hair to be inside the upline. They have these beautiful feet, so I want that feet to be visible in a certain way or you know... their calves look so good that I need to bend it, that's what...
Surprises in collaborating with another person	Being open to one another's' ideas, inspiration and creativity	1	1	But the way that they put it over my mouth could be hard, loose, knotted, not knotted, over a scarf, not over a scarf, that sort of stuff is their creativity that I'm letting in, and when I'm tying someone up I sort of expect that they'll be open for my creativity, because it is something that we create together within the boundaries of each other. I also have my own boundaries when I'm tying, I can't tie certain positions. I don't feel like tying certain things on certain people. And that is very important, because if you work with creating immobilities and creating sensations and immobilities, physical and emotional.
Taking breaks and coming back to it	Process and inspiration is the point	1	1	So, yeah, there was that, I suppose that came into it. But I think a lot of them, I kind left it for a week and didn't go back to it. Then came back to it and got fresh ideas. So, that's a lot of the stopping and starting process and there's no ... there's no sort of ... the end product isn't the main thing for me. It's like the process of getting it.
Trying things out	Trying different options easily	1	1	So, I'm just picking up this. I think of these as much on, imagine like on an elastic cord, these are, I've put a bunch of pins there. And so, I'm just pinning it here, pinning it there. And trying to think empowering there. So, empowering is....
Understanding a material rather than getting a specific result	Finding inspiration in material and going from there	1	1	I think for me when I'm working with material its more I'm open to the understanding of it. And then it might lead something, a client project for me to start on, but more its' just me understanding the craft process and the texture and getting the feeling.
Unexpected as a process of performance	Inherent unexpectedness when working with the body	1	1	The thing is that a lot of my work for the past ten years has had things with eggs inside of my vagina and usually that's pretty... Well, there's one thing that I like about it which is that it's pretty predictable the way that the egg comes out. How much effort and how long it takes varies a lot. One time I was doing a performance where it was simple but it was based on the egg in my cunt, and could not get that egg out. I've done this plenty of times, it's not like it'd really get stuck, but in this particular moment it took

				FOREVER, and then I had to work with that, also being stressed out like what if it doesn't come out! That's the whole thing I'm doing! I guess there's a lot of room for surprise in that way that I do performance, and especially in the ways that I manipulate my body or the props that I'm using.
Unexpected material behaviour	Unplanned performance result which enhanced the concept	1	1	Thinking about the magnets, plus and minus opposites, and also one sculpture was just made out of spikes, out of steel spikes. And that was also a part where I hugged this bear and definitely had the spikes on my skin also, but the magnets they didn't let me go. And in the end also the fabric didn't let me go because it all was intertwined. So, this, I guess concerning the performance or costume part.
Unexpected results when working in relief	Process includes inherent uncertainty	1	1	Yeah, there's certain parts where I'm like I can't, it's not clear to me how it's going to work out. Also when you draw, there's a certain level of detail that that doesn't well translate into the carving because the ink spreads in a little bit different way, it's not as precise. So I tend to make things which some parts are very detailed and some parts aren't, but whether that actually works right as a print is very .. so sometimes a draw a thing a certain way, and then I'll, as I'm carving it, I'm determining, okay, is this too detailed, and I'll kind of like reform it so it'll work out better in printing. Deciding what the image should be and then reworking it, like reinterpreting it step by step, like how well will that work, and is there another way that gets the impression without the original way that I drew it.
Using a medium because it gives unexpected results	Unexpected and pleasurable	1	1	It sort of works on a stencil principle and level textured. And there's some really nice like common stuff, really DIY and quite economical because the more you print, the better. But I really like the process because the ink colours you're getting on the riso, you can get gold, black... So, I think in terms of outputs its really satisfying. It's very quick. It's a bit temperamental. It has a mind of its own. And I really like that and working with it.
Using repetition to conceal mistakes	Debatable whether this is drawing inspiration or adapting out of necessity but is certainly unexpected	1	2	Whereas with this, if I cut a big line through my thing, it's like I either decide that my thing is going to have a bunch of lines through it and that'll be the new style, or it just looks crazy. It looks like a slipped and cut a big line through it. I guess that's how I imagine it.

Why We Use Tools/Child Codes	Description	Sources	References	Example
Accomplish a task/versatile	Reason for using tool and/or material	1	1	Like just on a very basic level, like be able to use like power tools and build stuff is quite important. It's a universal tool that is necessary for, yeah, even everyday stuff.
Aesthetic/Design qualities	""	2	2	And its just little things like that, where you ... isn't it skeuomorphic design, where the design mimics... I think Apple's grown out of that, but it was very skeuomorphic, like a bookshelf looked like a bookshelf. I think its maybe similar like that, with like the language I use to teach design, or I'm thinking in my head, where am I, okay the post-it one does this. And whether its skeuomorphic thinking, I dunno if that's a thing, but yeah, have that parallel cos suddenly its tangible and it ... yeah.
Best way to communicate	""	1	1	I talk, and when I talk, it's kind of like... occasionally I have a text for performances, but generally it's like either I do silent not dance but kind of movement-based, ritual things, or I talk in more of like a conversational tone. But with my own work it, and maybe also part of the fact that I don't speak a lot in my own performances is because the places that I had to do it was like a nightclub or a bar or a... you know? Something where there's... It's not really conducive to, it's not like a theatre where people go to...
Clear relationship between time investment and results	""	1	1	Yeah, I'm cutting out and digging out the linoleum. One thing I like about linocut is that you actually get this big pile of trash, at the end you get all of these strips, and some are really long, and somehow that is satisfying to me, I feel like I've really done something. I think that's another thing about performance, especially because I tend to make new performances all the time instead of doing the same handful over and over. I have a handful that I do like that, but normally I make a new one per event, and especially because most of my process is in my mind instead of in action, it's hard to feel like I'm doing anything. So it's nice to see a visual artefact of okay, this was like this before, now there's less, and it's very clear. Same with painting, that's satisfying, okay you spent three hours, it's clear.
Ease of use	""	1	1	So, when its something a bit soft around the edges and its got these kind of references that I can understand and references in my language that I'm speaking, both visually, when you see an icon also, like verbally, it makes all the difference because suddenly I could like get that. So, you can go yeah, I'll save that, whatever. Copy? Yeah, I know how to make a copy you know. Its, yeah, I think that makes a big difference opposed to most, like, coding it into this inaccessible like language of computer design. The people that are using them aren't computers, if that makes sense.
Ease or difficulty of achieving desired results	""	1	1	Yeah, it's about the thickness. So these sets come with five different tips... and also the very thinnest ones are often actually quite hard to work with. And are they the ones that slip the most? Maybe. I think that it might be true that the thinnest tips, like this one I think is a one, that's the one where it's easy to jump and then you have a big line somewhere else that you don't need to do. So yeah, when I'm starting a session I would prefer to start with a bigger one, that is a bit

				smoother, I have more room to like... I'm taking longer strokes, etcetera etcetera and then as I get more into it I can move to the smaller ones and then....
Easier to handle	""	1	1	And cos its still a bit sticky, I'm using the spoon to put in the rest.
Experimental quality of results	""	1	1	It like, making the linoleum is the first part, it's a very discrete part from making the prints. And the prints are way more experimental because of the pressure, actually. Like is like, is the ink the right layer and thickness on the block, and how even can you make the pressure.
Give you the most control	""	1	1	And sometimes your fingers are really the best way to finish a spot because that's where we have the most control, your fingers.
Gravity easily keeps it straight	""	1	3	Oh yeah, I just put it as high. So, the string is for the balance of the stick. So, because generally, or because of Schwerkraft, the Earth weight.
It allows you to adapt	""	1	1	Sanding it, yeah. Exactly. You can adapt it, but not reverse it. I guess also, if you draw things, you're not ... you cannot really reverse your [pause] ... your line even you were to rub it away, but because you still have to print I guess. So, I guess for a perfect, whatever perfect is, but a result that doesn't show your mistakes, I guess starting over would be the best method.
It's a softer extension of your fingers	""	1	1	Your sponge really becomes an extension of your fingers which is a great tool you use because it's a lot softer, it's like a softer surface area for the clay instead of your two pointy fingertips.
It's cheap and easy to handle	""	1	1	I just mix it and I have a cooking spoon because it's the cheapest form of mixer. And its just easy to handle.
It's the right size to do what you need	""	1	1	So I hold these two ends in my fingers, and some people do it like this, but I like doing this to my arm because it feels more... it's like the right length for me to keep the ropes.
Know how to use it	""	1	1	I'll use for example natural light because it appeals to my aesthetics without having to know exactly what I'm doing camera wise.
Manipulates material effectively	""	1	1	For linoleum cuts, I have to carve, like I carve, draw on and then I carve a sheet of linoleum, I have a chisel and I take long shreds of linoleum out. And then, I have this block and I roll on ink and then I print it.
More precision and detail	""	1	1	I'm going to use a wooden tool. It's pretty sharp on the end. You want to make sure you clean all the old clay off because you'll see that hard mark that's left, okay. So I'm going to use the rounded edge and take up a little bit of the bottom.
Quick prototyping	""	1	1	I think I'm gonna work on empowering anger at the moment. Yeah, but I'm not sure. So, in terms of ideas I'm thinking about, if I'm working at a desk, and again it depends where I work I like to have my notebook where I can just scribble, just think and like I let my hand do the work, I don't do the thinking on that front.
Skills translate from tools we already know	""	1	3	I think once you understand that ... yeah, once you understand how it works, like in Photoshop you just have layers, just sheets of paper stuck on top of each other obviously, so treat it like that it is, everything is easier. Yeah.
So it doesn't stick to the	""	1	1	Vaseline in the form that I will put the liquid concrete in when I'm done mixing. And I put

form				Vaseline in because when I take the product in the end it will just be easier and smoother to take it out again. That works actually with everything very well, also with plaster. Its just grease kind of. Its very good. Yeah, not so stick to the form, to the negative.
So your hands don't stick to the clay	""	1	1	Your hands have to be wet so they're slick and they don't stick to the clay because that's when it becomes off-centre.
Suggesting ideas	""	1	1	I use the Noun Project a lot. Sort of like a visual thesaurus just to get an idea of what sort of imagery I can use for this. So, if I'm doing a project, I'm doing a project at the moment about DIY knowledge. I got some feedback, they weren't feeling it, so I need to get back to the drawing board. So, I was thinking about I'm going to Noun Project and type in 'knowledge' and just see what comes up initially.
The size of line we want to make	""	1	2	So first I'm figuring out what I want to work on, and since I haven't worked on this piece in awhile, I'm working on more outlines, more bigger line details, because just getting used to using the chisel again and how much pressure... a lot about the chisel is about pressure per different chisel head, per line, so just getting used to it, it's easier if for instance, a long line, like this is easier to make, especially when you're in the flow of it, is more satisfying than here on the feet when you want to make all these little cutouts. I don't want to start with that because it's too.. I already have to be a little bit in the flow of working with the material to like get that right.
They provide unexpected and satisfying results	""	1	1	It's like a really old school photocopier. It sort of works on a stencil principle and level textured. And there's some really nice like common stuff, really DIY and quite economical because the more you print, the better. But I really like the process because the ink colors you're getting on the riso, you can get gold, black... So, I think in terms of outputs its really satisfying. It's very quick. It's a bit temperamental. It has a mind of its own. And I really like that and working with it.
To control the shape	""	1	1	I'm going to go over with the red rib one more time. And this is also a nice way to control the shape.
To give a smooth finish	""	1	1	Always want to either use a little piece of leather or I use my red rib to finish the shape, give it that last pass because it makes it nice and smooth and pushes all the sand that's in the clay back into it. Gives it a nice finish.
To improve the material	""	1	1	Oh, so maybe in two senses. One is that these ropes have their own materiality, so you have to work with them, you have to treat them, you have to burn them, you have to put some, maybe sometimes you have to boil them, you have to put some baby cream or jojoba oil on them. So you work with the material, but then you also work with different materials, so there's rings for suspension or carabiners again for making suspensions easier, but you could also do it obviously without carabiners. So that kind of, those add to the material aspect as well.
To keep the clay slick	""	1	1	So now I'm going to use the sponge in my right hand and I'm going to dampen it, get the whole thing nice and slick.
To make it easier later	""	1	1	I'm going to get my needle tool and I'm going to stick it underneath at the very bottom because

				this makes cutting the piece off of the bat much easier if you already have a gap in there.
To move the clay faster consistently than you would be able to otherwise	""	1	1	You want to really compress those particles. And you want to get as close as you can to a like right angle on the sides and now, so we were at full speed for the centring and the opening of the clay and now we're going to take it down to pretty slow and I'm going to take my foot off the pedal because I lose a lot of control if I'm worrying about that.
To protect yourself	""	1	1	Okay. Let me clean them. So, now I clean my hands. Because its sticky. Just shut the Vaseline box. I had put on the mouth protection and the nose protection. I could also use glasses, but I mean, I ... I mean, I'm young, I don't think about that stuff, that... The first time I made this, and I didn't, it was very sticky, I went in with my hand and afterwards, I had fingers, or my hand, my palm was like when you were in a bath for an hour. Because it took out all my liquids I guess. So, it felt very awful.
To soak up the water so the piece doesn't get too wet	""	1	1	Okay, so now I'm going to compress the bottom. Very important because if you don't compress the bottom with a sponge, you'll get little cracks in the bottom of your pot.
Utility of tool for task	""	1	2	So for Photoshop, I use it for editing photos. I won't use it for type, I won't use it for my ad. Because that's not what the tool was designed for. Indesign is great for that. Great for grids, great for like, block type setting. So, I use the tool for what its designed for. I wouldn't use a paint brush to write my name on a form. Its that kind of ethos and spirit I think.
Wide variety of possibilities	""	1	1	I like that orange. That orange can ... right let's move that there. So, what I really love about Illustrator its got colour bits. Again, I don't think this is necessarily a professional way to do it. This is just how I work. So, its got tonnes of pantone colours. And I just pull up one of those libraries which is on the canvas like this. And I just like kind of like mosey through and a try a few, and yeah. And switching this here. And this.

Body as Material/Child Codes	Description	Sources	References	Example
Ambiguity of gender created by costumes	Capability of body material	1	1	And I really like morph suits a lot, so I, because it has this anonymity and a very nice beautiful texture, and if you, yeah if you maybe also hide your breasts, or move in a certain way, its also very gender ambiguous. So, I like that, that you are such a ... you're just a human body, but very neutral and nobody from the audience can project anything on you because of your looks, which I also like because I like people to think of my performance on one side as an art piece that is just maybe nice to look at, it is aesthetic, but also that they can put themselves into it and maybe learn something from it because they connected with it. Yeah.
Arc of recognisable action has to be completed or repeated	Mandate of body	1	1	And I had it, and I was in the performance that I think... I've done blowing up condoms plenty of times before in my life, and I've also done it with glitter in it in a different performance years before, but I hadn't rehearsed that action. The thing that I forgot is that I was using a lubricated condom, and in the moment it was slipping and I couldn't get my lips firmly around it to blow. But then, I'm already doing, I've already done... This is the mistake performance where the audience can tell, because if you're already doing an action that's clear that there's an endpoint or a goal to the action, unless you make it a repetitive loop of failure, which yeah, is a good save, you gotta pull it off. I couldn't blow up that goddamn condom, but luckily I had a second one prepped. Eventually I just gave up on the first one and went to the second one, and the second one worked. That's an obvious mistake for example, in performance, that because of the arc or because of the interaction with the prop I couldn't get around..
Body and surrounding costume is material	Body as material	1	2	And so, when I do performances with my own body, I guess its material and then everything that surrounds it, so I can transfer my message is also my material. So, also, my costume I would say is a material. For the street thing I was mentioning with the sugar, I tried to just wear very neutral standard clothes, pants and shirt. And it was a sunny day, so I also wore a hat. But it was just because of the circumstances.
Body empathy and imagination	Body as material	1	2	And it is a tiring process to be tied up, so you have like... especially in suspensions it is stressful on the body, your hands might fall asleep in certain positions, and you have to like... as the person who's tying, you have to be keeping that in mind so that weight levels on the shoulders and on the hands change so that the hands don't fall asleep in the same position. The person who's being tied up, they have to be aware of their body's responses to certain positions and whether or not they're safe in the sense of permanent nerve damage.
Break free from and inspire perception of self	Capability of body material	1	2	And then I start to think start to think about maybe more of a situation and how it will, or I maybe go into the position of the audience, and I think of, okay, so how is the society right now as I think it is and, how would I like it to be. And then I rather think of, okay, so this would be a thing that I need to do in public with strangers. And then I think, okay, what should I do then and how can I interact with the people without disturbing them too much. Because I don't think

				that if you point fingers and make people feel bad then you actually achieve the opposite.
Collaborative relationship in terms of boundaries	Body as material	1	2	But the way that they put it over my mouth could be hard, loose, knotted, not knotted, over a scarf, not over a scarf, that sort of stuff is their creativity that I'm letting in, and when I'm tying someone up I sort of expect that they'll be open for my creativity, because it is something that we create together within the boundaries of each other.
Communication important when working with the bodies of others	Body as material	1	1	Yes, in the sense that if I'm... if someone else is tying me up, they can only assess my pain limit and they have to work with that, with my input, along with my input, it's not like I lay down and tell them only at the last minute. But I usually, in certain difficult positions, not in playing but in practicing especially, but also in playing, I like to give input in the way that it makes sense because it's a ... the physical limitation of it concerns the health risks in those pain terms.
Considering sensation on areas of the body and the whole	Capability of body material	1	2	So I extend the rope, put this in full tie, and I'm going to have my leg up like this. Go through my finger [toe] ... and... at this point, basically, my body's positioned, my upper body's positioned in a certain way so that there's not much I can do to change that. So instead I work with my lower body and I make some tights here. And so I'm thinking that I want to come up somehow so I go over the leg again. Maybe I want to incorporate my shoulder. And... I have only this much of rope left and I'm really close to my face, so I can always go through my neck, and go through my face and ... in a way... and... now I'm just going to finish up here because my rope is out and yeah this sort of a thing. I mean normally I would have, if I was doing it alone, put this [rope] over my mouth and this over my eyes to just you know, sit around a little.
Decisions based on sensation	Capability of body material	1	3	And um, it's as if I'm tying someone up, I'm thinking what sort of a sensation do I right now feel like having in my body. And usually the easiest way is to... would be to start with some kind of a solid point on the body, so I could just tie my hair up, although I'm not sure how successful this will be. If the hair is clean, it falls off the ropes super easily, it's incredible.
Discomfort of the audience when something seems uncomfortable	Capability of body material	1	1	Though sometimes I'm surprised, usually I've gotten quite good at placing it in the right place with the speculum pretty fast and getting it in the right place, but sometimes I have to dig around, and then the audience has to watch me dig around and get increasingly uncomfortable. Usually because I think for many people it's intense to see someone stick a speculum inside themselves and open themselves up and invite people like yeah, come look! But then if they perceive that there's a relationship to physical discomfort, that it's not going easily or whatever, I think it can really freak people out.
Fluid exchange, body fluid as material	Body as material	1	1	Sometimes there involves, like fluid exchange, like I did different things with breast milk for the time that I was lactating. So like I did a milk bar, I also did a performance where at the end of it I put milk into like little shot glasses and handed it out to the audience...
Inspiration and limitation	Body as material	1	1	I want to tie myself up right now in a cage that was hanging nearby. There was actually a cage and it was like... it was a cage that you cannot fit two people in, so you literally cannot do a two person bondage scene in that cage. I felt like I really want to tie myself up in this cage because it has this symbolic meaning of being like restricted, and I like working with restriction in a

				theoretical sense because you can... we are restricted by ourselves, by our body limitations, by the way that we were born, that's a birth lottery, and this is something I think about in my head, and the cage became for me, in a performative sense, an element that I want to... I want to tell that you don't have the whole space to do bondage. You don't have a free room with one ring. We are limited in the room and also in our bodies, because once you tie yourself a certain way, the motions are limited.
Inspired to work with aspects of the body in the moment	Body as material	1	1	And um... other than that, I come with certain, depending on my interaction with the person, I come up with certain stuff to do to them because that is how that is triggered in me. I want to tie them up because they have this beautiful hair, so I want that hair to be inside the upline. They have these beautiful feet, so I want that feet to be visible in a certain way or you know... their calves look so good that I need to bend it, that's what...
Knowing own limits exactly	Capability of body material	1	1	But the uh... when I'm tying myself up, I'm better at assessing that so because I'm hurting myself I can make that pain, I can choose to make that pain go away in a safer way. I know the exact limit.
Learning to describe how things feel	Mandate of body	1	1	I think for me the most important skill was for me to learn to be able to communicate what and how certain things feel, like precisely when I have my hands at the back and when they're tied up and when there's pressure on my shoulders my hands start falling asleep. It was really important for me to learn to communicate when that pain, when that numbness or the bite-y feeling, when that was nerval damage and not just... okay... so I had to learn to communicate that was.. or like which body parts hurt, it's not just like oh my body hurts, it's like 'my toe on the right foot hurts a little' because maybe, you know, check up on that.
Losing oneself in the practice	Body as material	1	1	I mean normally I would have, if I was doing it alone, put this [rope] over my mouth and this over my eyes to just you know, sit around a little. At this position, I didn't really think about it, but I'm holding this leg, so what I really prefer is like having the leg in a position that I don't have to hold, maybe this is like way nicer. But I like losing myself into the ropes. But yeah, this sort of stuff. Ta da!
Material and practitioner simultaneously	Capability of body material	2	3	Or sometimes my cervix looks weird where I'm like huh, okay, this is what's going on now. Yeah, there's a lot of body manipulation things like that and interacting with objects in performance.
Message has to feel okay in the body	Mandate of body	1	1	I think for me, since performance is an art, it is a mental process, and I think of an image or a message I want to give to people, and I also... but this is a body performance, it is something I create on myself, so it has to also feel okay in the larger sense of the word okay. I can't do it for the message, it has to come from me and my body to give the message in this format.
Opportunity to improvise when performing	Capability of body material	1	1	and so what that means is that often with my performances I'll have like a general arc of how I want the performance goes, and then I'm blocking like action to action, and then the actual, the in between parts are how it all moves together is not like choreographed. It's like there's room for some improv and there's this and there's... and what that means is if I make a mistake I

				might get really thrown off and disoriented and feeling lost or confused within my own piece and also mad at myself or whatever. BUT, probably it's pretty often that the audience would have no idea because, unless I just stop and have a look of terror on my face..
Physical flows from conceptual	Body as material	1	1	So I tied myself up inside the cage, it was like, it was a little bit taller than me, the cage, so it was pretty fine. And I tied myself to the sides of cage, and I fixed myself up in a baby-like position inside the cage which felt pretty... really releasing, in a way, it feels like in a womb but like... both restricted and immobilized, by myself and by my decisions, ... yeah. But I started with the message and went with the flow because I don't think of the end product in terms of what I want my body to look like, but I do think of the end product in terms of what I want people to ... what message I would want to give to people seeing it. Except for the message that they would take that is independent of me, because of course it's interaction...
Practitioner, body, and recorder at the same time	Capability of body material	1	1	In some of my videos I hold the camera while I'm performing, which is interesting, like having sex holding the camera on the sex that I'm having at the same time. My video Egg is like that, for instance.
Pressure and weight of the body	Body as material	1	2	Just remember where you finished. And I'm not like having big big big knots when I'm tying myself up, because you know like I don't want to forget how to get out of them. But you know in suspensions of course I'd have knots. For this sort of a thing I like frictions because frictions work wonders. Like it is incredible, if you have the right pressure and directionality on a friction, how much it can just simply hold. You can tie someone up based on frictions as well. Sometimes I am coming up from, when I'm trying to untie myself from an upline, and even when the knots are over the upline is still holding, because of the pressure and the directionality of the pressure.
Process action of the body is the piece	Body as material	2	6	So, I also put the material inside of me in the end. But if you would say, the art piece is only the picture then its something different I guess. Because the picture is then standing apart from it. And its just about the aesthetics and the meaning that the title gives it. And yeah, so I'm not eating the picture, so its not, you could say, the art is not inside of me, but maybe the process, how I ate the fruit.
Pushing own boundaries of pain and sensation	Capability of body material	1	2	I actually tried to suspend myself by hair once. I couldn't handle it, so I did a halfway thing, the hair, fix it up, and put it through my crotch and hung myself up with... hair-crotch-rope.
Self-tying as more valuable performance	Mandate of body, participant opinion or preference	1	1	And I don't... well I think this is a bit controversial, but I think the performance aspect of bondage is most valuable for me when it is self-tying. That is, one person interacting with the audience and it's a different art that someone tying someone up in a performance setting.
Surprises in the process	body as material	2	2	Thinking about the magnets, plus and minus opposites, and also one sculpture was just made out of spikes, out of steel spikes. And that was also a part where I hugged this bear and definitely had the spikes on my skin also, but the magnets they didn't let me go. And in the end also the fabric didn't let me go because it all was intertwined. So, this, I guess concerning the performance or costume part.

Symbolism and ritual of self-presentation	Body as material	1	1	Cool! And um, yeah I guess a lot of it is about kind of... finding a concept, and a lot of it's about symbolism. Symbolism of the props that I use, or the way that I have a costume or present myself, and then finding a concept and then kind of like enacting that within the frame of a ritual or something kind of ritualistic like that. But there's always variations as well.
Transforming the body is experiential	Body as material	1	1	And, yeah, I thought I would die, just because I was out there for 40 minutes. So, it was quite crazy. A self experience I guess.
Transforming the body with the environment	Capability of body material	1	1	And now what else could I say. Ah, yeah, maybe, I'm thinking of a couple of pieces I did. For one video piece, I again, transformed maybe myself and my surroundings because I undressed on Tempelhöfer Feld, this huge park in Berlin. And it was winter-time and the snow was lying. So, I got naked and I guess I transformed my body because I took off my clothes. But I also transformed the surrounding because of the warmth of my body, the snow melted a little bit. And, but the snow, or the weather itself was so cold that I transformed myself, because I just dropped a couple of grade ... not grades ... Celsius, degrees.
Using the body to transform the audience	Capability of body material	1	2	So, and sometimes yeah, I work with involving audiences sometimes in the ... now mostly when I do stuff on the street or outside, or when I do it with strangers, so I guess I also, I take them out of their comfort zone and confront them with things. Which for me, is like a task to make them think about things they wouldn't rather think about, or in ways they wouldn't think about. So, I guess maybe, I transform the material audience.
Working with different bodies requires different accommodations	Mandate of body	1	2	Well, there is of course the main thing is there are safety concerns, like you have to do certain things to be able to hang someone up, and if you do it in any other way that puts them... I mean there are different ways to do that but if you do it out of any one of those ways you put them into a risk that... I don't feel comfortable with because I wouldn't want anyone to be putting me in a risk. And that's why I follow that certain harnesses have certain ways of making, you cannot make them any other way around, you have to have a different harness to accommodate that person, which I'm more than happy to do. Like because I... for example, I'm not a very skinny person, but I still feel like I'm within the limits of doing certain harnesses that wouldn't hurt my shoulders, but certain people over certain weight limits should not be put in those harnesses because those are not designed for their bodies. They should be put in different harnesses, purely for those safety reasons. And also, certain people have body limitations because of nerve damage, sports, spanking... so you can't really, if someone has a huge bruise on their leg, you can't really push into that bruise-
Working with the body to create sensations	Body as material	1	3	Or sometimes I want to create sensations in them. Like I want to blindfold them, or I want to, or I want them to be super aware of everything and I want them to annoy them, or so, that would also be a... [laughs] You know, I want to hurt them mostly because they like being hurt, but also mostly because I get something out of hurting them in that way, so I want to push their bodies to a different limit, because the pain involved is not the same pain in bondage is not the same pain in impact play, it's endurance pain and some people, including me, really like that. Yeah.

Body as Practitioner/Child Codes	Description	Sources	References	Example
Audience as material	Practitioner treating audience as material	2	5	So, and sometimes yeah, I work with involving audiences sometimes in the ... now mostly when I do stuff on the street or outside, or when I do it with strangers, so I guess I also, I take them out of their comfort zone and confront them with things. Which for me, is like a task to make them think about things they wouldn't rather think about, or in ways they wouldn't think about. So, I guess maybe, I transform the material audience.
Communicating a message with the body	Communicating message with body/Using body to communicate	2	4	So I tied myself up inside the cage, it was like, it was a little bit taller than me, the cage, so it was pretty fine. And I tied myself to the sides of cage, and I fixed myself up in a baby-like position inside the cage which felt pretty... really releasing, in a way, it feels like in a womb but like... both restricted and immobilized, by myself and by my decisions, ... yeah. But I started with the message and went with the flow because I don't think of the end product in terms of what I want my body to look like, but I do think of the end product in terms of what I want people to ... what message I would want to give to people seeing it. Except for the message that they would take that is independent of me, because of course it's interaction...
Considering risks to others	Considering risks as practitioner	1	3	Because that is important, because it's, I mean, it is.. bondage is one of the most dangerous aspects in... within BDSM scene, because you can of course hurt people incredibly by hitting them and hitting their nerves, but with bondage, even in the softest version of bondage you can hurt someone in a very irreversible way. There are cases of people not being able to hold things after they come out of certain positions and I don't want that happening to anyone.
Considering risks to self	Considering risks to self as practitioner	3	8	What I've learned is the most important part of this is using your whole body to push forward and not just like your arms and your wrists. That's a big part about ceramics and throwing, it's really like putting your whole body into it so you're not just hurting one part of yourself.
Exhausting self in practice	What participant wants experience to be like (exhausting)	1	1	And maybe when I think about me working with things, I like it exhausting for me. I like if I really, if its like kind of exhausting to work with it, and its, yeah not so easy to do the things. Cos I sometimes have this, yeah, can everybody just do it. No, I wanna make something special or something different.
Feeling inspired	Deriving inspiration from body about what you want to do with your body	1	2	I come with certain, depending on my interaction with the person, I come up with certain stuff to do to them because that is how that is triggered in me. I want to tie them up because they have this beautiful hair, so I want that hair to be inside the upline. They have these beautiful feet, so I want that feet to be visible in a certain way or you know... their calves look so good that I need to bend it, that's what...
Hands changing quality of material	Interaction changes materials	1	1	My hands like, the more you touch it the more you are absorbing the moisture, the natural moisture that is inside the clay, so it gets a bit more drier over time.
Improvising	Skeleton+details in	1	1	Like blowing up a balloon. Like they're very simple physical things that you've done a million

	practice			times in your life, but when you want it to go, when you have a particular structure in mind of how to interact performatively with things, it's like, my brain does not furnish all of the detail that actually happens when I'm doing that to get to where I need to go. I can remember one performance I did years ago and part of it I blew up a condom that had glitter in it, it makes like a big glittery condom balloon... So yeah, I had it like in my... bra? But I wasn't wearing... anyway, I had it on a little place: I like to make things I think of as altars, so my props in kind of an altar configuration for me, I'm not sure if that's read by anyone else that way.
Leaving traces of the artist's touch	Artist's bodily effect on material, material as documentation	3	8	Exactly, fingerprints and fingernails. Those are, that is probably the biggest thing. And it can't really go back to it's original state, essentially it comes in this block, and that's never going to happen really again. That whole thing about being able to revert back to it's original state, I mean you can get close, but you can't really go back to the way it was manufacturally made.
Manipulating the body with or in your body	Practitioner perspective on performance	3	14	So, I guess with, I did once a performance where I wore a white morph suit and I sewed in magnets. And, then it was during an exhibition of friends and acquaintances of mine, who build sculptures out of steel or metal in general. So, my performance was walking around, dancing and interacting with those sculptures, but being always like stuck to them also. So, that's how I kind of manipulated the ... my body as being also a material and the costume I wore. And because of one, some sculptures were a bit lighter, so also their positions were manipulated in this situation.
Materials changing quality of hands	Materials changing body	2	3	The first time I made this, and I didn't, it was very sticky, I went in with my hand and afterwards, I had fingers, or my hand, my palm was like when you were in a bath for an hour. Because it took out all my liquids I guess. So, it felt very awful.
Not doing 'it' right	Not having a muscle memory or sense of what's right, or going outside it	1	2	So I think that I have a lot of like internal conflict of feeling like I'm fulfilling whatever the ideas are of how it's supposed to go, whether that means entertaining an audience versus like doing an action that I find interesting or how I'm supposed to be working with my materials or how I'm supposed to whatever whatever versus having space enough to try whatever feels interesting enough. I have a lot of conflict with that, and it's probably part of why I stopped doing solo performances so much.
Paying attention to the way the body is interacting with material	Awareness of particular mode of interaction	3	18	Okay, so first step is wedging the clay, kneading the dough and what I've learned is put one leg forward and you can switch either side and my right side is pushing and my left side is controlling the way it moves. And I want to get a nice spiral going at the top and then I can switch. So then I'm pushing, whatever side is forward with my body is the pushing and the other hand is the making sure it stays in the right spot. It's hard, I usually do right hand doing the pushing but it's hard on my wrist so I've got to switch it up, it's good practice.
Process becoming physically automatic	Muscle memory	1	1	Its kind of become almost wanting to reach the point of it becoming intuitive. Wanting to reach the point of it becomes nature of you almost just, your fingers can dance on the keyboards and that's it. That's like something that I really wanna aspire to, but that's sort of happened naturally, like so it becomes natural. I dunno, it comes, you get to that point when it comes like persevering and crying and Googling and it not working and all of it.

Tools that aid the body in interacting with material	Tools to extend the body	2	8	Your sponge really becomes an extension of your fingers which is a great tool you use because it's a lot softer, it's like a softer surface area for the clay instead of your two pointy fingertips.
Body as Secondary Artistic Subject/Child Codes	Description	Sources	References	Example
Bodies as necessarily restrictive	Body as restrictive mode of expression	1	1	I felt like I really want to tie myself up in this cage because it has this symbolic meaning of being like restricted, and I like working with restriction in a theoretical sense because you can... we are restricted by ourselves, by our body limitations, by the way that we were born, that's a birth lottery, and this is something I think about in my head, and the cage became for me, in a performative sense, an element that I want to... I want to tell that you don't have the whole space to do bondage. You don't have a free room with one ring. We are limited in the room and also in our bodies, because once you tie yourself a certain way, the motions are limited.
Body as visual metaphor	Body for its similarity to other objects or ability to carry dual meaning	1	2	Like some of my stuff is stuff moving from back to, I dunno maybe I can get you know, the shape of a face or something like that, and then turn it into something else. So, I'm going to take a side profile, I'm going to take... sort of extract the ideas from that sort of seed. What else do I do. Yeah, but all sketching and processing.
Body as way of engaging others	Body engages others specifically	1	1	I work with involving audiences sometimes in the ... now mostly when I do stuff on the street or outside, or when I do it with strangers, so I guess I also, I take them out of their comfort zone and confront them with things. Which for me, is like a task to make them think about things they wouldn't rather think about, or in ways they wouldn't think about. So, I guess maybe, I transform the material audience.
Creating art about physical experience	Art about own physical experience, to process it	1	1	So, there's, I did a scene about menstruation. And so, I was just really annoyed about my period, and that was enough. And that led to me to process something and kind of, just through work, and through a design. And that process of essentially, of making that, like you know putting stuff on a page, of layering it, and doing whatever, and creating the visuals to go with it, something helps deconstruct it in your head. I find it so resolving, and so amazing, and it's so fulfilling.
Creating documentation	Whether the action, documentation, or material are the art	2	2	But that would be my "author's intention". I hope I will get to actually do it in a proper way and maybe even record it.
Engaging all senses in an installation	The body as viewer being incorporated into the work	1	1	Yeah, all of those things combined, and sort of like, a major underlying thing that always arises in my work on a visual or aesthetic level: I'm really interested in being able to sort of tap into all bodily senses within an installation. So like I'm definitely concerned with not only the visual but also how the environment effects what you're listening to, what you smell, how you feel inside of the space. So within that there's always.. I wouldn't necessarily call it interactive, but like, these

				things are within the air. So I'll use sound, I'll use scented fragrances, as an example of an installation. And with all of those things, it's very much about using synthetic materials that have been made, usually things I've actually made, to mimic things in nature. So this idea of replacing the natural world, or even using our own natural bodily senses with the synthetic which is kind of constructing and also a critique of how we're always trying to perfect things to our most comfortable... way of living.
Process and documentation as different pieces	Documentation vs artwork, where is the line	1	2	So, I also put the material inside of me in the end. But if you would say, the art piece is only the picture then its something different I guess. Because the picture is then standing apart from it. And its just about the aesthetics and the meaning that the title gives it. And yeah, so I'm not eating the picture, so its not, you could say, the art is not inside of me, but maybe the process, how I ate the fruit.
Process as experiential	Process of representing self is necessarily experiential with performance	1	2	For one video piece, I again, transformed maybe myself and my surroundings because I undressed on Tempelhofer Feld, this huge park in Berlin. And it was winter-time and the snow was lying. So, I got naked and I guess I transformed my body because I took off my clothes. But I also transformed the surrounding because of the warmth of my body, the snow melted a little bit. And, but the snow, or the weather itself was so cold that I transformed myself, because I just dropped a couple of grade ... not grades ... Celsius, degrees.
Representing human bodies as their environments	Humans are things other than bodies or can be represented as such	1	1	A lot of it has to with the construction of identity and also re-appropriation, so representations of whole selves and their existence within the real and the virtual world and also how those two worlds aren't actually separate but are in unison with one another. And kind of how between those lines blurring... what sort of dialogue is addressed through it and what sort of issues arises and ideas of representation. So representation of your identity, representation of your gender, like an object of artwork... essentially kind of how it's, I feel that it's kind of hard to differentiate between all those things because of appropriation and... sort of the idea of objectifying anything, so either like objectifying humans or yourself or your environment or nature or technology.
Self as image or message	Self as message or messenger	1	2	But I started with the message and went with the flow because I don't think of the end product in terms of what I want my body to look like, but I do think of the end product in terms of what I want people to ... what message I would want to give to people seeing it. Except for the message that they would take that is independent of me, because of course it's interaction...
Sensation over image	Whether it matters more what the body communicates or how it feels as experience	1	1	So I'm just going to go through my body here, my upper body. This is maybe not the fanciest thing to do in front of a camera, this looks a bit... this is not like pro modelling. But I like that.

Talking to people in work as you're creating it	Talking to the subject of the work as though personified and sentient	1	1	I think that especially ... I don't know if I do this with performance but visual, video things where there's a specific object or material that I have to manipulate, I think I talk to it a lot. Especially when I'm frustrated. But like, sometimes also with praise, where I'm like 'ooh, that was a good one'. But I think it's a ... this piece is a portrait of my friend Dr Hal, and I'll refer to it by his name, I'll be like 'come on Hal' or just talk to the material basically.
Visually highlighting aspects of others	Specific to the person	1	1	And um... other than that, I come with certain, depending on my interaction with the person, I come up with certain stuff to do to them because that is how that is triggered in me. I want to tie them up because they have this beautiful hair, so I want that hair to be inside the upline. They have these beautiful feet, so I want that feet to be visible in a certain way or you know... their calves look so good that I need to bend it, that's what...
Identifying with Material/Child Codes	Description	Sources	References	Example
Easier to work in material one doesn't identify with	Relationship between artist and material	1	1	In a way I think it's easier for me to work in a medium I don't identify as, like I definitely identify as a performer but I don't identify as a filmmaker but I do occasionally make films.
It's in my DNA	""	1	1	Like I think, I dunno, its somehow in your DNA , like this is how I process the world. Its everything. I dunno. I don't know what I'd do without it, but yeah. Its my best relationship.
Not wanting too much control in life or art	""	1	1	I think that for me at least, within my art practice and even within my life, it's about taking huge risks, and not being able to go back, committing to that decision and whatever the outcome is, it just is, whether you agree with it or think it's great or whatever. I think it's important to let those things exist how they should exist. That's just me thought for myself, how I work.
Talking to material	""	1	1	But like, sometimes also with praise, where I'm like 'ooh, that was a good one'. But I think it's a ... this piece is a portrait of my friend Dr Hal, and I'll refer to it by his name, I'll be like 'come on Hal' or just talk to the material basically. I know that when I'm working on video editing I talk a lot to my computer and generally out of frustration but sometimes out of 'oh thank god, thank you for that'. Also I ask questions verbally out loud of my materials, like 'wait what am I supposed to do here, ahhh' . 'What are you doing?' 'Don't do that', yeah, things like that. That's the last thing, that was it.
That's what I am, what I love	""	1	1	I'm really just doing clay because that's what I am, what I love.

Verb	Sources	References
Absorbing	1	1
Adding	2	11
Adjusting	1	3
Arching	1	1
Attaching	2	2
Bringing	1	1
Building	1	1
Bumping	1	2
Carving	1	8
Catching	1	1
Centring	1	5
Changing	2	6
Checking	2	2
Choosing	1	1
Cleaning	2	16
Clicking	1	1
Coiling	1	2
Collecting	2	4
Compressing	1	13
Coning	1	2
Controlling	1	6
Copying	1	2
Crocheting	1	1
Cutting	3	5
Dampening	1	3
Deciding	1	1
Deleting	1	1
Destroying	1	1
Determining	1	1
Digging	1	1
Doing	2	3
Dragging	1	3
Drawing	2	10
Editing	1	1
Exchanging	1	1
Exhibiting	1	1
Extending	1	2
Feeling	4	13
Filing	1	1
Finding	1	3
Fixing	2	8
Focusing	1	1
Folding	1	1
Forcing	1	2
Getting	3	17
Hanging	2	3
Holding	2	6
Incorporating	1	1
Interpreting	1	1
Jumping	2	2
Keeping	2	2
Kneading	1	1
Leaning	1	1
Leaving	2	3
Lengthening	1	2
Limiting	1	1
Linking	1	1
Looking	2	3

Losing	1	1
Making	1	1
Massaging	1	1
Merging	1	3
Mixing	2	16
Moving	3	13
Negotiating	1	1
Opening	2	4
Painting	1	3
Pasting	1	3
Peeling	1	2
Performing	1	1
Picking	1	2
Pinning	1	2
Placing	1	1
Playing	1	1
Popping	2	2
Positioning	1	2
Pouring	1	1
Preparing	1	1
Pressing	4	9
Printing	1	4
Pulling	4	36
Pushing	4	28
Putting	3	19
Reforming	1	1
Reinterpreting	1	1
Remembering	2	4
Reworking	1	1
Rigging	1	1
Rolling	1	3
Rounding	1	3
Scraping	1	2
Scribbling	1	1
Sculpting	1	3
Seeing	3	3
Sending	1	1
Shaking	1	5
Shaping	1	1
Shaving	1	1
Sketching	1	2
Slapping	1	2
Smacking	1	2
Smoothing	1	2
Squaring	1	1
Squeezing	2	4
Squishing	2	3
Stealing	1	1
Sticking	2	4
Stretching	1	1
Supporting	1	5
Suspending	1	1
Switching	2	2
Taking	4	11
Testing	2	2
Thinking	4	19
Thinning	1	1
Throwing	1	3
Tightening	1	1

Touching	1	1
Trimming	1	1
Trying	3	4
Turning	2	9
Twisting	1	1
Tying	2	3
Using	6	34
Waiting	1	3
Wanting	1	1
Wearing	1	1
Wedging	1	1
Working	3	4
Zooming	1	1

APPENDIX D WORKSHOP STUDY: GROUP INTERVIEWS

Post-Workshop Group Interview with P01 and P02

27 January 2020, Hatcham House 1, Goldsmiths Campus

KHN: Alright great, so what you were just talking about, so what was, which is, I think this is the question that you were answering, so I'll repeat the question and...

P01: Yeah, sure, yeah, yeah.

KHN: ...you know, you can repeat what you said and if you want to add, you know, go for it, but: what was not included in the tool that you would find creatively or practically useful?

P01: Right so it's a really good question. So that means what kind of things it can be further developed?

KHN: Yeah, if you were just talking about, in terms of being able to add functionality...

P01: Yeah, because actually I think for me what it means to be a humanoid body, it's actually, because also from my own experience of using different kinds of 3D, especially like avatar modelling software, like the one I mentioned a long time ago when we did the pizza party, is called VRoid.

KHN: Yeah.

P01: That one actually they have this kind of section first is you're modelling the body and the second is you can choose the dress, the clothes, like the male school uniform or the female school uniform. But actually you can't modify the uniform because it actually is a really conventional one, in 3D modelling software actually, then you can export them into the dancing communities. You're making cute boys and girls with school uniform and dancing or communicating. So I think for me it might not be like different part, it just appears another part of your body, thinking about like, two heads, or I think all those things can be achieved by adding basic shapes. I think that would be really interesting, probably starting from a cube, a cone, yeah I think people can, you can say 'add it on head' or somewhere, people and I think the players can really kind of play with it. It's actually addictive and

also it much fun, yeah. But I think the other thing and I don't think it's necessary but I think it's great to be asymmetric because everything is not symmetric, yeah.

But I'm also thinking of those things where they had this symmetric toggle thing, like where you can toggle back and forth. But I do think it's quite trivial. I think it needs to be simple, interesting, can add things. And the other part is I think yeah, because actually we haven't tried the other part like pose, animate, geometry, and materials so I would be really, really intrigued to know what's the next step. Like if I finish the part of modelling, I think the skeleton is originally, is automatically generated with the full skeleton. How the skeletons can also be generated if you had a cone or a cube, just one or two really simple, so saying people can imagine if I had this opportunity to add a cube or cone, I can use it to be another legs or hands or the limbs or like things you know, things, things, things, so animate... I think the material, well I think it's too much. I think now, yeah, I think the powerful part is the modelling, it's intuitive and if we can add things because actually I don't think a lot, in most of these 3D modelling... that you can add a basic form into the body and easily integrate them together.

Is, yeah, you have to form their own kind of logic, yes. I think it can be made as much into it as possible. I think part is add, the other part is just saying not too much but destroy, cut. I think that part probably is too complicated. Yeah. I think it's nice, that's what I think in terms of this. The essence of the software, yeah, I mean compared to those other mainstream 3D modelling software, yeah, yeah.

KHN: Yeah. P02, what would you find useful there?

P02: So yeah, in a practical sense, some, so you click on the tools and then you drag the person's body, sometimes the body doesn't move when you drag it and just some feedback from the system saying 'Oh you've reached a limit in this direction' or something like that would be useful I think.

KHN: Hmm.

P02: And I think actually yeah, so being able to maybe, well maybe this isn't the point. Well to be able to move the camera maybe a bit more. There was once or twice when I was trying to zoom in. So I had the character like sideways. I was trying to zoom in on its ear but he was like just too far that way or something and it wouldn't...

KHN: Yeah.

P02: ...I had to zoom back in to see it. I couldn't move the...

KHN: Right.

P02: ...avatar back into the middle. Maybe that was me though [laughter].

KHN: No that's good. That's good to know.

P02: Yeah, so yeah just to be able to swing the camera around or something like that. Yeah, that's all I was really thinking during when I was using it. Yeah.

KHN: Yeah. Okay.

P02: So that was in practical terms you were thinking?

KHN: Yeah.

P02: Yeah.

KHN: Well creatively or practical...

P02: Oh creatively as well, yeah, yeah...

KHN: Was there something else that you would, that would impact your use of the tool more creatively?

P02: More creatively, erm, yeah I'm just going blank now [laughter].

KHN: No that's fine. Which aspect of the tool did you find that you used the most during the course of the session?

P02: I think there was a couple of tools that I used more than others. One was the add and collect I think and the other was, oh yeah it was yours, I think it was push and pull. They seemed to give, for what I was looking for, they seemed to give the most... They were the most responsive tools for what I was doing. Another thing I used and that was to zoom in and zoom out functions, yeah. I was kind of constantly zooming in and out to different parts.

KHN: Mmm.

P02: Yeah, yeah.

KHN: Yeah.

P01: Me...

KHN: Yeah.

P01: I think I used a lot of push and pull and add collect. Yeah, I think those two. Sometimes though I used a bit of squeeze but yeah, I think it's quite in a way often I loved to use pull, it's like drag. You have to drag things everywhere. Yeah, I think push and pull probably the most frequent, yeah, actions.

KHN: Yeah.

P02: Actually the figure views were quite good. So you can just quickly switch to back or front or...

P01: Yeah, yeah, yeah.

P02: ... I didn't actually, so oh wait no, you're asking what were the most I used.

KHN: Yeah.

P02: Probably front, back, right and left of the figure views. I didn't use top, bottom and PoV view

so often.

P01: I think for me this figure view is the most important. I sometimes used top and bottom to check where is the high details and I think it's quite, they are quite, even though you're separate when you're adding the zoom in and zoom out, yeah. Constantly checking from different parts, yeah. I think it's really simple and useful, yeah.

KHN: Okay. Which aspects of the tool did you find difficult and what would you change?

P02: I think for me, the most difficult was kind of yeah, so I think this is probably maybe similar to what I was saying beforehand. When you would drag either left or right or up and down and nothing would happen so trying to figure out what...

P01: Yeah, yeah, yeah.

P02: ...like why it didn't go in the way I wanted it to.

KHN: And how would you change that? Off the top of your head.

P02: How would I change that? So...

KHN: I mean you were saying something about having it give you some kind of...

P02: Some sort of feedback, yeah, yeah. I think that...

KHN: Yeah.

P02: ...I think that would work yeah. If like, if you maybe, if you, yeah maybe if you were at the limit of a... Maybe that's why it didn't, if that's why it didn't move, then if it told you it was at the limit then we should know oh well we can't do that. Or else if that particular tool for that particular part of the body wasn't the right tool to use. like if it wasn't possible to squeeze, I don't know, his forearm or something, I don't know if that's...

KHN: Right.

P02: ...that's the, yeah...

P01: Yeah I think I have similar, like I share with P02 upon because if they had some just simple feedback, let's say, when you can't move or how much you can move and yeah. I think it's not difficult, it's just if we can move. A little bit more feedback helping more, yeah. And the other part I think where you use up and down, left and right, I think it's the left and right, it's not that, I think it needs to be more expands, like if I click left it just moves too slow. I think probably it's actually if left and right, this thing is actually it's zooming in a bit. It's actually not that left or right but I think up and down is okay. Yeah, I think probably it's the way how you define left and right inside the coding. Yeah, yeah. And I think it's good to like this gesture like you up and down. It's simple, it really is simple. Yeah. I think that was, yeah, I think left and right is something I think, yeah.

KHN: Hmm.

P02: What might be, yeah, no, sorry.

KHN: Go ahead.

P02: Just had a thought there.

KHN: Yeah.

P02: Just spewing it out.

KHN: Yeah.

P02: So to make really fine adjustments. So you're clicking and dragging, but maybe if you only wanted to move the piece of the part of the body you're working on, like really finely, maybe having the arrows move incrementally...

P01: Yeah, yeah, yeah.

P02: ...if it's selected or something or something like that. I don't know if that's possible or...

KHN: **Hmm, that's interesting, yeah. So did your idea of what you wanted to make change over the course of the session today and if so, in what way?**

P02: Yeah I suppose mine did. Well, when I came into the session from the very start, I didn't really have a set character that I wanted to make really. I was kind of just going with the flow and seeing what arose during the session and I think when we did the collaborative thing at the start, that really kind of informed what we did then in the individual thing. But then even in the individual part, my ideas of what I was doing kind of changed as I was working because of the yeah, yeah, just kind of evolved I supposed. Like I think the, when I started the individual thing I had these kind of ideas. I achieved all them I think but I think it became something a bit more interesting than I actually thought it would. So yeah.

P01: I think for me for individual part, I really kind of like regard the software as a kind of new canvas and trying to just use this sketch as... Kind of unexpected actions, just kind of to stimulate another kind of new ideas just come from me. So it's that like, yeah, I think it's definitely changing and adapting but sometime I kind of reflect back to particular gestures and way from the conceptual drawings. I go back and forth, so I think software, I think make me think lots because I don't really feel waste, didn't waste time on rotating, making drag, you know because it's too simple so you can't waste time if you don't need to correct and go, you don't need to reset, you don't need to, no, so think and where is the unexpected? [Laughter]. Event, yeah.

KHN: **Did you both come in thinking that you were going to make something abstract or was that something that came up for you in this session?**

P02: I think that came up in the session actually when we were talking about, when we did the drawing listening to the sound and then trying to translate that into the body form. Yeah, I definitely

when I came into the session, I thought yeah, I didn't know what I was going to do [laughter]. But yeah, it became a lot more abstract than I thought it would be.

KHN: And for you, P01?

P01: Yeah, I share with P02's idea but I think from my part I think it's great to retain certain kind of abstraction. I think there is a kind of really kind of new inspirations where like thinking doing the modelling based on a humanoid and I like this kind of interesting relationship of an abstract humanoid and yeah, I think actually this stuff gave me that kind of restriction and freedom and kind of unexpected because it didn't give you a lot of feedback. So you don't know, you have to try, zoom in, zoom out, have to try, yeah. I think probably most of the 3D modelling software, the objective is trying to make a precise action, with just like... yeah. But yeah, so I think this one is just go another way, the opposite way. So if with P02's like suggestion if you gave a certain kind of feedback but this kind of relationship of freedom and restriction can be really kind of crazy, being too crazy in practice. It force you to try and be creative because, yeah, yeah, really can give time to think within this software yeah. It's actually, it give you a pencil, it just give you one pencil, like black colour.

You have to do something. But for like conventional 3D modelling software give you a lot of, a bunch, probably like this whole table of things, he has no bloody idea [laughter]. Oh shit, oh fuck, oh shit, so, yeah, yeah. That's what I kind of do reflect on this kind of limited functions and even the limited views. For me I feel it's okay. I don't really mind. Whether it has more cameras or you can rotate, I don't know because it's enough for this sets, for me actually it's enough, yeah.

P02: Yeah, I think that's a really good point that you made. When you're faced with being able to do literally anything that often is too much and actually stops you creating, to sort of have a yeah, yeah, to have some restrictions and some limitations actually fosters creativity in a lot of ways.

P01: As long as the software is safe, is stable, I think...

P02: Stable yeah.

P01: ...stable and I think can make a lot of unexpected things to be honest. Because like, deform, pen tools, pencils, erasers, you can't do anything but it's actually I think, why I was using pen tool when I was a small child. I really thinking about what I would draw, what I want to draw.

P02: Yeah you can think kind of past technology to the actual art.

P01: Yeah yeah, say if I went into Maya or other 3D modelling. Oh my God, it's different wheels, perspective from, sometimes you just miss it and you clip something, you don't know what happens. I'm not like a mature, really experienced user of a particular software because I'm constantly changing to different platforms so yeah, I think simple simplicity is really important, yeah.

P02: Yeah.

KHN: Okay. So the survey asked about this a little bit and I know that you do have different

experiences but you know, what I guess in terms of your past experiences with systems that model you know, 3D humans, whether it's like standalone software or game character creators, sort of things like this, what is sort of your perception been of the capabilities of the systems and how do you feel like the output of what you can get out of this system compares to sort of more systems that already exist in the world?

P02: So yeah, my primary experience with like avatar creation tools is actually more limited to games and you know, when you're setting up the character in the game, a lot of the time you just have these kind of I decide what hair to give them, you decide what clothes, it's really limited. These limited kind of choices. You can't affect the shape of the character at all. So in terms, like compared to that, something like this, this way of creating an avatar is a lot more expressive and there's a lot more you can do, you know. Yeah.

P01: I think for me is like I think in the survey you're thinking there is one question like you are really kind of getting involved into the process, you know, thinking about software. That was a really interesting because I don't really think about software. I'm just thinking about how I can make thing just whatever is unexpected or I want more control or less control and I think compared to the mainstream, all those different platforms and software, the objective of my intention is just trying to use the better part of that certain software to achieve my objectives. So if there is some unexpected thing happening that's really interesting. With most of them, you go to export some certain format or adding something and yeah, I think this one, it's too simple, so I can get into it easily, yeah. You feel you have really familiarised, yeah. So yeah, I think that was... You forget it, yeah, important, yeah. You're inside and processing, making, not inside or process of learning, we're learning, debugging, checking, yeah.

KHN: Yeah.

P02: Yeah.

KHN: Yeah.

P01: [Laughter]. That's really important. Most of the time is debugging and checking what the hell happened.

KHN: Yeah.

P02: Yeah that's something that like I think is a problem with all digital art making tools is trying to get that balance of getting past the tool, getting past the learning, the tool, because if it's too complicated then your whole process is actually just about learning the tool and you're just learning new techniques really but you're not actually implementing them in an artistic way or you're not integrating them into your...

P01: Yeah, yeah, yeah.

KHN: Yeah.

P01: I think it's unique, yeah, yeah, quite special, yeah. I don't have that experience before. A similar one is Sculpttris, Sculpttris is not stable, it's fucked up every 30 seconds or I have to constantly save it. So this is why today, why this one is really stable.

P02: Yeah.

KHN: Yeah.

P01: It's really, really annoying.

KHN: So it crashes like...

P01: Yeah, fuck, because it's there, it's actually and automatically generate too much polygons when you drag and add and squeeze. It just gives too much polygons and when you have those kind of as it is non-conventional form or you're trying, because it's not triangulated, so I think they don't really know what's happening so they just crash because most of the creative way of modelling is not commercial, going off, blah... Yeah.

KHN: Wow, that's... Yeah.

P01: So I think stable is very important, yeah.

KHN: Okay that's the end of my questions.

P02: Great.

KHN: Do you have anything you wanna add? Any part to it?

P02: Yeah, I think that idea of just becoming engrossed in what you're doing, that actually happened just there during the individual part. Yeah that's quite rare, I think. So yeah, probably just eat more pizza but it's yeah, I experienced that as well during that, so yeah, that was really good, that's a plus like.

KHN: Yeah.

P01: I think I have some point to add because I have lots of these kind of practicalities is actually waiting for a saying, don't make this offer full screen because it's really important because there's a VRoid animation technique for actually where you have different size window of this really modelling software, it's actually sometime it's just make your Mac really really struggle, because actually need to render a lot. Yeah, so I think probably this limit going to be a really interesting feature because you can't zoom in, zoom out inside so I think this also is saving the power. And I think the way of this software, the uniqueness of this software, is actually if it can retain this kind of simplicity if you can, actually you have to export into the other platform, it has this kind of optimised magic polygon, also you have the skeleton. It can be easily be used to different kind of platform. You also can upload to the sketchpad and using it to outline. It's really, really interesting. It's really, really important, not like the other sort of well you need to optimise, too many polygons, sometimes fucked up, has one format

of certain community, yeah.

I think if the simplicity is really important. If yeah, we can make it really kind of extreme because when I was using the VRoid that is really, really slow because I think it was made by using Unity so it's basically you open up a game but you open up with full screen. You can actually, it's actually not a comparison with this one. It's not modifying the whole body. You have the much more freedom of modifying the hair, but actually this software you don't have the hair but if there is one you're modifying the hair, I think it's going to be really fucking popular there because most committed people are how you define the genders and the identities for young people or how it's important the hairs, how long it is, what is the texture and the detail of the hairs. I think the hairs is really important inside popular modelling communities, where there is male or female or like transgender, the hair is really important. Hair, eyes, I think the face and hair, but I think the hair is going to be really interesting. But in that software it's really difficult if you add more hairs, really fucked up. I have that kind of 700 micropaths of way too much hair, so yeah, that's something probably relating to the idea of my suggestion of adding a cone or a cube, yeah.

KHN: Yeah.

P01: I think that's everything, yeah.

KHN: Very good, yeah.

P01: I can think of, yeah.

KHN: Nice.

P02: Great.

KHN: Great.

P01: Fantastic.

KHN: Okay, thank you so much.

P01: Thank you.

P02: Cheers, thank you.

KHN: Yeah. [Laughter].

P01: I'm really looking forward to further, I think you probably gonna have more experiments regarding...

Post-Workshop Group Interview with P03, P04, and P05

25 January 2020, Hatcham House 1, Goldsmiths Campus

KHN: Okay. Thank you so much for taking part in these exercises. Very useful. So, I have some questions for you already written down and then at the end I may ask you a couple of questions that are a little bit more what happened specifically. We should be out of here by 4:00 at the absolute latest. So, just to give you an idea of timing. If you really want to keep talking, you can but it's up to you. Also, I would like to get a response from each of you. If you don't have anything to say, that's fine. If need be, I can go down the row. But also, if somebody says something that triggers something for you and you want to say something, go right ahead and do that. It doesn't have to be so... like that.

So, did you find that your idea of what you wanted to make, in either of the brainstorming sessions or while you were working, changed over the course of the session today and, if you did, in what way did it change for you?

P03: After first using the software and then going back and then going to think about what I wanted to make again, I sort of had more of an idea of its capabilities, so sort of tried to tailor it for the software to something that I'd actually set out and maybe produce rather than try to.

P04: Sometimes, when I want to create something really software-y but sometimes I can't actually quite get what I want, then I have to change my idea to see what is the potential of the software, the shape it can create. Yeah, sometimes I need to modify the ideas.

P05: With the first one I tried to... Like as I started to understand what the software could do, I tried to force it to try to do what I wanted it to do but for the second one I tailored it to the capability of the software, not so much for what it could and couldn't do but more so what the constraints were. So...

KHN: Does anyone have anything to add?

P04: Then sometimes when I use one function, what I found is very strange.... These two functions had a similar or same effect when I used... when I clicked this button. Sometimes when I used the first function or the second function, I found they can do similar things and this will be confused what specific effect this function can create. This is a little confusing for me sometimes, when I used it.

KHN: What was something that wasn't included in the tool that you would find useful, either creatively or practically?

P05: When you... During the second exercise, when I was working through the side view and I got the figure to look as how I intended to look and then I went to another view and it wasn't as I expected and thought that it would be good to have a navigator for the interaction of the views. So, if I changed

in one view, I could see how it changes in another.

P04: I used modelling software that when you modify in one view and there is actually four views in the screen together, the front, side...

P03: There's something like that in Unity, isn't there?

P04: Yeah, sometimes there is. And when you modify the model in one view and another three views, they will change and you can directly see what will be happen in the whole view, something like this. This is that... It is only on this location and I can't change like these four views together.

P05: Another thing was to parameterise the mouse. So, I can only use the right-click but it would be nice if I had... I don't know what you call it, arrows, I guess, so I can... Like if I'm only able to use a mouse, at least I can manipulate multiple arrows in different directions, and also shapes as well. So, if I wanted to go to X, Y and Z, I can manipulate the model and extrude it in any direction and then, depending on what size I wanted or shape, I can create a shape in the middle of the model so I can extrude or... whatever size to really... Even if you can't adjust the contour individually, you can actually have like a global manipulation.

KHN: Right.

P03: I think it would be good... Especially if the... your idea with the ear and the tail, to have just like a free sculpt tool so you can just add excess matter on top of what's already existing. Because then you could have built up some ears and could have built a tail. I think it also might be more natural to P4. I come from... I guess anyone that's thinking about it in a three-dimensional way, if they're actually sculpting, then you could add... That's really more... makes more sense to someone who hasn't used like anything techy before. Also like... So, this says add/collect for that one tool. Does it add or does it collect?

P04: I had the same question.

P03: And then carve/round. You say carve, make corners and rounds things but it's one tool. So, which one does it do?

KHN: You're saying you found this confusing?

P03: Yeah. I mean, if you went on it and then on first shot you go on tool and it allows you to do one version of it and then another version, like plus or minus, then that makes sense but to have one tool that does both, I did not know what it was doing.

P05: I thought that maybe that in one direction it does one thing, in the other direction it does the other thing but then I found that it all did the same thing.

P03: Yeah, that's what I thought. I thought that as well. Or like up is bigger and down is smaller and then it worked sometimes and then it didn't.

P04: Actually, I think it would be more easy for the total beginner to use this modelling software, just like very natural as people do something in the physical world, like with clay. So, it will be more easy, just like very simple tools, to pull a shape out or push the shape in, something like this, and select the area, which area I want to manipulate out or in, just something like this it will be. And the... Something like the force.

P03: For the words that you're using as well, and like the description of tools, if it was... Like, for example, squeeze and loosen, like vocabulary-wise I wouldn't know, if I had a sculpture, what I would do to squeeze it or loosen it. I don't really know what that does. Add makes sense and push is good but I imagine it would be like stretch or distort or... Carve/round, what do you think would be like good terminology? Smoothing something. Smooth.

P05: Yeah. I thought those were actually pretty straightforward, the carve, because when I put the... I think it's only because I was thinking about sculpting, like to carve and then to... But then as it applies to the software, it's not the same. Like it's totally abstract. And round. Like round seemed really straightforward but I couldn't get it to be rotund when I was trying to adjust the stomach, which I didn't understand.

P03: I remember carve being a cutting out tool.

P05: Right, exactly.

P03: And then round or smooth being just like...

P05: Right. Like a polish.

P03: Yeah. But obviously I was kind of confused between the fact that they were both in one tool.

KHN: Right.

P04: And another thing is that... So, the starting point for this software is the model that you gave to us and actually the starting point of the model, it was strange or difficult to manipulate the shape to how we want. It's not like a very normal shape.

P03: I think that was done on purpose. So, that was interesting.

P04: So, if it will be a very normal shape of the people as a starting point, it will be great for just some default model of the people that they can choose. Or this is just a blank as a starting point. Just to build from the zero to one. Or there is some default shapes that like sphere, cube, cylinder, something like this, but maybe the aim of this software is to sculpture a human. So, very different model as a normal human.

P03: A little bit more human than what was default.

P04: Yes.

KHN: I feel like we've already started talking about this but is there anything else that you

found difficult or that you would change about the tool? Have we talked about that already?

P05: It could be more flexible and, yeah, I guess it got to the... You should be able to make local variations as opposed to like whole variations where... And also the symmetry. So, sometimes, like you were saying earlier, when you made an adjustment, it would affect both sides of it but sometimes you don't want that and sometimes you just want to have like a local control so you can control just what's on the...

P03: Like I put the entire body over there. So, sometimes it does, sometimes it doesn't.

P05: Yeah, I had no idea how you did that.

P03: Yeah, I have no idea either.

P05: It looks great, though.

P03: I'm not too sure about low detail, medium detail, high detail. I just... Like I guess to me that concept just doesn't really...

P05: I find that the concept was okay because you kind of... What I found problematic about that is that it decided what you can move in those details where conceptually I get it. Like it's okay if you look really close up, you want to manipulate the nose or the ear or the fingertips as the high detail and the low detail as the whole body but it also shows which parts of the body you have access to. So, even if you wanted a high detail but you want it on the hip, it's not considered a high detail area.

KHN: Right. But you didn't find the categories intuitive.

P03: So, the low detail, so when you say, oh, it allows you to do the whole body, what does that mean? Does that mean like the outlining of the shape or is that the size of the head or size of the legs? And then the high detail I get but what is the difference between medium detail and low detail? Yeah, also the fact that we... That you can only control some things and then... Because I found myself trying to apply high detail in areas that didn't have that option.

P05: Right.

P03: So, I was doing it in low detail and medium detail and then screwing up everything around it.

KHN: Anything else?

P05: I find like with the point of view where the nose is up, kind of get lost in that view, so you don't know where you are and I found it difficult to zoom, the keyboard zoom, when I did the keyboard positioning when I was in that view.

KHN: Right.

P05: I think it's good because you get really close up and you can see but considering that there's no like minute detail contour changing, it seems really difficult to adjust. Because I found sometimes when I adjusted something in the... that was red, that it affected the white part.

P03: Oh, yeah. Except...

P05: And it's like the white was not supposed to be able to move.

P03: This is really early on, that you moved the red but quite often we were accenting with the white and then it would move...

P05: Right.

P03: And another thing I just remembered as well, when you're in... using your arrow keys to navigate around, the zoom changes. So, just to bring that up.

KHN: Which tool did you use the most and why?

P03: Push/pull because it made... It was the one in which I felt I could sometimes make things bigger or smaller on the basis of that's what I wanted to do to start with. So, I was trying to come to grips with getting it there, to get the basic shape that I wanted.

P04: Push and pull too, yeah. I think I used it more close to the natural behaviour of the human they want to make the model into real physical world, just to push and pull things.

P03: Yeah, if it was, like you were saying, a can, like to push it in or to pull it out made sort of sense.

P05: Me, all of them. I kind of rotated. I didn't really use one more than the other. So, I just kept rotating it so I can move something that responded to what I was doing and then I just kept rotating and changing the viewpoint and then rotating the tools in and out, just to see what I can change. So, I didn't concentrate on one or the other.

KHN: Do you have anything else to add? Okay. So... And then we asked this in the survey, and you have different experiences, but based on your experience of either tools for modelling human characters, whether they are independent or in video games or just kind of knowing that things like this exist, if that's something you were aware of before today. I'd like it if each of you could talk a little bit about like what your idea of the possibilities of the systems are for making humans and how you feel like this compares or fits into that. What's possible there.

P03: So, my only experience of creating modelling is in VR...and that obviously the operating system is very much similar to... Compared to this it's much more similar to actually physically doing it because you do it with your arm movements and you can work in a 3D way. So... But as soon as you do it on the computer, you're forced to work in 2D onto something that's 3D, so it's not very intuitive and it never will be, unless you have some sort of tool to enable 3D movements.

So... What was the question? What our experience was? Oh, what we thought the capabilities were. Yeah, so I guess in my head the capabilities are use the operating system which we know the best, which is 3D real world movement and sensors and they touch things. But I guess, yeah, the ability to like easily move around, so like whether that's... I discovered the like 4862 keys, being able to like turn it up, down, like that. So, I guess that sort of makes things easier, if you could use tools at the same

time, I think. For me that's quite a big ability because it allows me to work around edges.

KHN: But in terms of the output of like systems for modelling humans.

P03: The capabilities and the output?

KHN: Like the actual model that you can get from...

P03: What, how good it could be or...?

KHN: Like what you're...

P05: Expectations?

KHN: Yeah, like what are your expectations of a system like that and how do you feel like the tool that you've used, the output that you're able to get from it and like compares or fits into that universe of things?

P03: Maybe someone should go. [Laughter].

P04: So, for me, actually, my background is about product design and most of the model software we are using is parametric but for this non-parametric modelling, actually, I like it and I tried the ZBrush Maya, something like this, but I think this software is too advanced because this software are designed for the game designer, something like this, and they have many functions and tools that you can use, very flexible for people... for users too.

But for some entry levels, just like me, I have the experience of some modelling software but for total beginners, that they want to make some characters like this, how can they get into the software very quickly, that's the problem, and ZBrush, Maya is totally not very friendly for these people to use and I think the potential for this software is that it can be designed for this very total beginner to build their characters. It can be not very professional advanced for them but just very simple and simple functions for them and they can get into very quickly. Yeah.

And actually I have twice done video games and some video games that the first step is to creating your own character and actually you can, how say, change the colour of the hair, the skin and height, weight, something like this. So, I think it will be more... Something like this will maybe easy for the total beginner to choose the default model and their starting point, something like this, and... Yeah.

P03: It's like a nice in between going in on the main and picking select options that make it very limited to only what the designers think should be a thing. But not to the level of Maya but be in the middle of like... for people that really, really liked games. I mean, like I remember Call of Duty, you were allowed an emblem, like a little logo that went next to your name on like the end bit, and people would get so creative because like you could get all different colours and all different shapes and people would make amazing emblems, you know, people who really want to do it more than just, okay, I'll play this game and character play the game, cool. People might go into this and be like, oh, I can make my character really different or really like me or... and allow you to change things like actual real ideal

body types, I guess, because, yeah, avatars are obviously not very realistic.

P05: I haven't really modelled anything. I haven't... I think I opened ZBrush once in like 2012. I met this guy in Istanbul and he did everything in 3D, even his text coding, everything, was in 3D and his ZBrush models were insane and it's the first time I'd ever seen anything like that. But it's like one of those things that you're interested and you're just curious because it's not something that you're going to like do or it's one of those things, I'll learn it later because you're not really focussed on that. Of course later it's like 20 years later, whatever, but I follow a lot of artists on Twitter because I love just seeing art. Like I love... I don't really play games. I like a few games but I love game art and I love watching people create stuff and seeing the type of things they create and I follow this one person and her ZBrush stuff is just amazing and it's like how could you ever like... I wouldn't even have the patience to sit down and do that but it's nice. Even though this is... Like you were saying, this would be entry level, it would be nice to be able to manipulate even surface stuff to get some kind of... Even just to understand the concept, so you can move to another tool.

P03: Some other texture.

P05: Exactly, yeah.

P03: Have you heard of 10,000 Hours?

P05: Hmh?

P03: Have you heard of...?

P05: Yeah, I also heard it was bullshit. Yeah, that it's not really true but...

P03: Oh, no, it's just a page.

P05: Yeah.

P03: And like people post their stuff.

P05: Are you talking about the idea that you have to spend 10,000 hours into something?

P03: No, no, no.

P05: Okay, yeah.

P03: It's just a page called 10,000 Hours and people don't necessarily put 10,000 hours in but it's just a page when people feel like they have honestly done something for ages and they want feedback and they want to show it. But it's normally like amazing work.

P05: I'm going to check it out when I get home.

P03: It's on Facebook, I think. Mostly visual effects or 3D or...

P05: I guess I'm not going to check it out.

P03: Why?

P05: I don't do Facebook.

P03: It's on other things as well. I was searching around, but obviously it's more than just... I mean, it can be like a water bottle but it will be the best water bottle you've ever seen and it will be like raytraced and like whoa. It's so great.

P05: Yeah, I can be that. But I feel like I'm... I like text coding more so than using higher level tools. So, it would be really... Like I like working low level stuff, so I don't think that I would ever be like... be in a job where it's, I'm hired to do this stuff and I'm just really curious about how things get done in code but...

So, I guess that's interesting as well. Like you can have like a code... like coding layer of this and that'll also, I can see, help people understand what's going on underneath and if they wanted to change something with code and not with modelling, manipulating. But, yeah, so... I don't know. I mean, there are so many ways to get into a tool but it would be nice to have like a lower barrier to entry one, especially for something that's so high tech.

P04: And just a sort of idea, that how to make it more easy for the beginner, something like a kid to use the software to create some characters, maybe the software can be using the iPad, something like this. So, just use your finger to move and something like you make the... planning the real world. So, this may be more easy for children. Sometimes this is the right audience to use this software. Or, maybe even more amazing, combining with some emerging technology, something like motion capture, the LEAP Motion and VR technologies and maybe they can totally... a very brand new user experience, to use something like this modelling software in a new environment so that they can use total decant to manipulate and model.

P03: I've seen someone at Queen Mary do that. Sebastian? You obviously don't know the people but he had a leap motion... a screen and you could like squish stuff on the screen and it was like really weird. But like the same concept. It's like taking... Like what I was saying earlier, how your tool should be used.

P04: Because I think these kind of experiences will be more easy for the total beginner and even the kids that can have fun with this building software.

KHN: Okay. And then I have a couple random questions. Did any of you try to make either the arms or the legs disappear? You did?

P05: Mmh-hm.

KHN: Okay. And neither of you did.

P03: I mean, the arms were like...

KHN: All right, thank you.

P03: But not purposefully, though. I think I stripped a muscle.

KHN: **And then my last question is I noticed that you two were like clicking around in the other tabs. And I guess I'm wondering like what was going on for you when you were doing that. Like what were you, were you trying to do?**

P03: Being well nosey. [laughter].

KHN: **Nice.**

P04: Actually, I tried the function at the pose/animate, this one, and I think it is very interesting for me to use something like this to change the pose, using the default pose in the software. Yeah, it's good. And I'm not sure the function... something like the skeleton, what is this function for, but I know some of the modelling software, they can change the skeleton, the position of like this, this and you can create a pose totally by yourself and make the animation.

KHN: **When you were doing that, was there something that you were trying to do specifically or were you just looking?**

P04: Actually, if I want to make a human for my product, to show my product, how humans use this product, I think the default position will be very good for me to use, so I can just create a normal pose, like grab, sit, stand, something like this and put my product with the human. And also the expression, it's very good that I... Yeah, I like these functions, expression, pose. It's a lot like I'm in a video game and I can change the expression of my character.

KHN: **So, you were trying to do that when you were looking through them, doing the exercise?**

P04: Yeah. It's good.

KHN: **Yeah, but I'm asking like what were you trying to do?**

P04: Oh, you mean this function?

KHN: **Because we were only using the modelling category.**

P04: Okay.

KHN: **And I'm just like wondering like what were you trying to do.**

P04: Because actually my...

P03: I was wondering whether there were clones. I know. Not now. I found the bit where it's like no genitals. I was just really confused by the whole testicles situation. But how... It was just like genitals were just testicles.

P05: But that's the flexibility of it, though, right? So, you can give everybody... You give the model everything for the person to start with and they choose what they want, so they can create the model

that they want.

P03: But he didn't have a penis.

P05: Well, maybe it's before puberty. I don't know.

P03: I was just nosing around. I was just a bit interested.

P05: Yeah, exactly what I said. When I first sat down I was like why would you give this type of model. But then I was like if you... You don't know what the person using it is going to do, so you give them all options and then they choose what they want. So...

KHN: **Interesting. Does anyone have anything else to add?**

P05: I enjoyed this, thank you. It was fun.

KHN: **Good, I'm glad. I'm glad it was fun.**

P05: It took me away from staring at my computer and writing.

KHN: **All right. So, if there's nothing else, yeah, you're free to go. Does anybody want me to send them their models?**

P05: Uh-uh, just pictures of the... Yeah.

KHN: **Is that okay?**

P05: Yeah.

P03: Yes, please.

KHN: **Okay.**

P03: This one?

Post-Workshop Group Interview with P06, P07, P08, and P09

23 January 2020, Hatcham House 1, Goldsmiths Campus

KHN: So, thank you for participating so far. In this section I have some structured questions for you. I'm also going to ask you at the end for any other feedback you have. I think I have maybe one other specific question about something that happened in the workshop but, yes, so this is... We're going to try and be out of here by... I want to say 9:40, 9:45 at the latest. Okay? Does that work for everybody? Okay.

I can go around on each question to each of you but if one of you also wants to jump in at the end, don't feel, you know, like we need to go in a row. Just kind of keep to yourselves. If you want to talk to each other, that's completely fine. Okay. So, did your idea of what you wanted to make change over the course of the session today, and if it did, in what way did it change?

P06: Yes, it did change because... Are we talking about our individual one or our pair one or is it everything?

KHN: Yes, just kind of everything.

P06: So, I think what I had in mind, I couldn't actually achieve it because I didn't know... I couldn't find the rules of how to control the controls. So, it seemed like if you do one thing it does something and it could be the thing that you expect it to do but then, when you do the same thing again, it does something else. So, it was a bit frustrating in trying to get whatever I had designed before, or thought I wanted to have. To actually make it, I found that I couldn't make it because I didn't know like what... how to move it, how to make the figure to actually get the... with the consistent like results.

KHN: Thank you.

P08: Yeah, I found exactly the same thing. Like I had something in mind that I wanted to do and then I couldn't understand, basically, what was the logic behind what I was doing. Like even... So, for the bit here, I couldn't tell really what was the difference in... You know how you explained like one is to pull, one is to lengthen and shorten, this I couldn't really... Okay, for the lengthening and shortening, this is how I managed to extend the fingers, but the other ones I was trying to reduce the size of the belly and I couldn't do that with the carve tool, the... and collect tools. I didn't see the difference between those two.

And, well, the only thing is like the different areas that it highlighted. So, I tried to... And I didn't understand what I was supposed to do with the mouse, how to control it best and, like you said, like you do one thing and it makes it bigger and then you do the same thing and it makes it smaller. So, this was a bit... So, I don't know if this is because I never used any kind of software like this before. Like there is a thing that you have to understand about... use it beforehand but as a first time user I found it quite difficult to control.

KHN: Thank you.

P07: Yeah, I agree, actually. I like the...really like the software and it's kind of when... Especially when you reset it every time, it gets you a new character and then quite random and fresh, a new role. And in terms of achieving what I originally wanted, it was a tiny bit tricky because it's not... It's really special and it's not quite similar to the conventional 3D models where you have the points and lines that you can manoeuvre and then you achieve the drawing that you designed, which was really good. But some bits, some tiny details that... Like if I were able to make a triangle or my character was kind of able to have this sharpness, a bit tricky to achieve that.

KHN: Thanks.

P09: Yeah, I thought it was really interesting. I felt really like... Yeah, I absolutely changed how I wanted to make things and what I wanted to make and think that was... There's like two parts to that. One was being very challenged by the bodies that were in front of me and being like, oh, wow, it just really challenges my perception of how things should move, yeah, with the change and like the bodies were often very wonky and I also observed us also saying, oh, no, it's less human and this and that and I'm like, well, no, actually, I've seen that body as a normal body, also as human, and I thought that was interesting, just how like we've framed and not framed like what human is in terms of whether it's wonky or not.

And I thought that was kind of interesting, that that was present and that challenged my perception of what I wanted to make and I also kind of felt exactly the same, in this way of like, oh, I couldn't control it, and I think I started to quite like that towards the end. I kind of felt like, oh, it's quite nice to like maybe give in to that and be like, okay, well, I can't really control it, so, fine, let's see what this like random logic does to like... when... in like relationship to... Yeah, like you make it together somehow. I liked that, giving up control.

KHN: It's very interesting. Okay. If there was something that wasn't included in the tool today as you used it that you would find like useful, either practically or creatively, what would it be? Like what would be included, if you could include anything?

P06: I would have a... Instead of like jumping from like front to side, to have more of a swivel so you can kind of rotate it.

P09: Yeah, I would totally say that, yeah.

P06: Yeah. Because I think that's partly... Like some... When using some of the tools, it seemed like it wasn't doing anything. But when you changed the angle, then it's like lots happened. So, like just an easy swivel so you can quickly check. Yeah.

P08: And also it was annoying a bit that when you were like on the face board bit and you zoomed in and then you wanted to turn it to the side, it would like zoom out straightaway, so you had to zoom in again.

P09: Yeah, I felt the same. It could be cool to have like a small window. So, you have that one big window that you work in and you can swivel in. But if that's not possible, to have like different views, so you're seeing what's going on all the time.

P08: True.

P09: That could be nice.

P06: Yeah.

P07: And I also make some shortcuts when you need to zoom in and zoom out and switching windows and perspectives.

P09: Yeah, this hand wanted to do something.

P07: Yeah, it was all one hand.

P06: Sometimes you'd use it on the arrows.

P09: Yeah, you're using it there. It's just that it felt so like lost.

KHN: **Shortcuts specifically for switching perspectives and things like that, yeah?**

P07: Yeah.

P09: Or tools. That can be nice, to have tools.

P07: Yeah.

P09: That reminds me of the thing you were describing with the glasses and you have two different tools. Yeah, like a palette.

P06: A palette and a brush, yeah.

P09: Yeah, that's cool.

KHN: **Anything else?**

P09: Hair.

KHN: **Hair?**

P08: Yeah.

KHN: **You wanted tubes also.**

P08: Yeah, I wanted... So, it would be nice maybe to be able to do different textures or something to stick on. Well, I guess that then becomes kind of clothing or whatever.

P09: Or being able to put another head on, things like that. We talked about that. It would be nice to be able to add body parts.

P06: Yeah. And maybe shapes as well.

P09: Shapes, yeah.

P06: So, if you know that you want... If we wanted our bulbous legs, we could have put like big spheres. Like we could have just taken the shape and added it and it would, I don't know, become that in skin.

P08: And also, I couldn't extend the toes. I was trying to do that.

P06: Oh, yes, we wanted to do that.

P09: Yes, that was a real problem.

P07: And also, so when I switched tools and tried to manipulate it a little bit, sometimes the different areas red out and some areas that you can control, actually. But I didn't quite understand why some areas that you can really control, like especially joints and joints. If I really want to change my posture to the front, then it maybe make it look like a different posture. But then those joints are actually quite fixed and then there's no way to make it highlight and then actually change it.

P06: I found the same with the... when I was trying to get the really smooth arms. It was hard to get that smooth kind of like just a single shape because the elbow was there and so they would have to be controlled separately. So, if would make this one slim and I would try and make this one slim, then I couldn't. This one wouldn't work, so it was like an overlap.

P09: Maybe you could do it... So, you could like shift like click on one and then click on another and then manipulate them together.

P06: Yeah. I was trying to do some shift... Because at one point I thought, oh, maybe if you do the opposite, then it will go in the direction. Because once it worked like that.

P09: Oh, really?

P06: Yeah. So, then I thought shift might switch between the directions.

P09: Oh, yeah, that would be cool.

P06: But it didn't.

KHN: Hm...

P06: I have one more thing, sorry. With the... If it was like push/pull, I was... Because sometimes you can't see where it's happening, so you think you're pulling it but it's actually pushing something somewhere else, so... And even in the squeeze and the... What's the other one? The other one.

P08: Loose. Loosen.

P06: Yeah. So, I wasn't... If I wanted to like make it squeezed, what I was doing, I wasn't sure whether I was squeezing it or if it was doing the opposite and whether that was because of where I was moving it from. Because the direction that I was moving it in, I couldn't figure out whether... Because

I'm moving it this way, does this mean I'm squeezing it or does it mean I'm loosening it somewhere else? So, yeah, I think if there's like, I don't know, a key or a shortcut or something that you can press that you know that whatever you're doing right now is squeezing it somewhere.

P09: Right. And also with that, to be able to know... Like often there was like, oh, this tool was working really well but I don't know what tool it is, it's not highlighted.

P06: Oh, yeah.

P09: And so that will be really useful, to be able to... Like it's indented or it just shows there's a signifier that it's different, which tool you're using.

KHN: Cool. Okay. Which aspect of the tool did you use the most and why?

P06: I used push/pull the most because that was the one that was responding usually as to how I was expecting it to. And then, again, because I wasn't sure which of the other ones I had selected, I was kind of just trying them all to see which... I didn't use move that much. I think I might have tried but I think I didn't see what I had moved. I couldn't see what had... what was done by the action. So, it was mainly push/pull.

P09: Yeah, same, push/pull and squeeze sometimes but the other ones, it didn't... I didn't really kind of get there. Sometimes they randomly did things and that was great but... And then zooming.

P06: And you used undo a lot.

P09: I used undo a lot, yeah. And the different... Yeah, I used the different faces, like which direction they're facing. But I really... I actually tried several times to like grab it and turn it and it just didn't.

P08: Yeah, I used push and pull a lot. That's what I... how I managed to pull out the fingers. And then I noticed that at some point, when I clicked on the low detail one, and I think I was using push/pull/squeeze/loosen. I'm not sure. I think all of them were actually highlighted in the same... like the whole body and I tried like doing... clicking around the head and pulling down and this was kind of elongating the whole body and this is just great. This happened just randomly and that's kind of what I wanted to do. So, I was doing that a lot and that managed to make the kind of body shape I wanted and then... Yeah, it was a lot like discovering just randomly what worked. At some point...

And then I used a lot of the high details for the face and the head and this I just... I just randomly went through them to see what highlighted, according to the bits that I wanted to change. So, that's why I was using it rather than it was squeezing or loosening and then I was just experimenting like what would happen. Yeah, it was... It's like you say, it's hard to know like what you're doing, whether you're squeezing or loosening. So, I just did it randomly. And I used undo a lot.

P07: Yeah, I did the same. Probably 90% I used push and pull and then the rest, 10% just even out with the other tools. And I couldn't really... Probably because it's the first time I'd used the tool, so I didn't really... can't tell the difference between the rest of the tools and the best four, so I just sort of

tried it and then habituate and see which one does what. And then I also think the push and pull is quite efficient in the purely fundamental level model and then you kind of... Because it's quick and is... will give the most straightforward effect.

KHN: Cool. We've already gotten into this a little bit but which aspects of the tool did you find really challenging, really frustrating, really difficult, and which aspects would you change, if those are different for you?

P06: So, the carve tool, I wasn't sure how to use that. Because I think I was trying to sort of... Because it wasn't working with the dragging... I wanted to ...just slice it, almost like a knife, an actual carving.

P08: Like when you're sculpting.

P06: Yeah, to kind of create the shape that... as in the... where I wanted it to be.

P08: But it didn't work.

P06: No. I think it's a drag. So, that was... I think it was a bit frustrating, not understanding the rules of what is going to be the reaction of whatever action you're doing. I think it's fun in that it makes things that you don't expect and you're like, oh, that's cool, but if you have something in mind that you're trying to do, I found that quite frustrating, like when I was trying to get the top part... the legs to be slimmer and I tried all the tools and I couldn't figure it out. So, that was a bit frustrating but, on the other hand, like when it makes things that you don't expect, it's quite nice and you're like, cool, that's... I'll go with that, that's a different idea that I didn't think of.

P08: Yeah, I did the same. I was trying to give him a neck but this was like impossible. I don't know. I was trying for ages and I couldn't find... In some of them it actually highlights this bit under here but every time I tried to manipulate it, it was just giving him this big chin and it was not like ever extending. But, yeah, at the same time it's quite nice that you get some surprises. Like I did some great stuff with the head in the end and that was nice. And I love what you did with the foot.

P09: The foot in the head.

P07: The thing I really liked is, I think I said before as well, the reset. It's quite different compared with the other sort of... where you always get standard... The reset, sometimes it'll give you a really unexpected but interesting... sort of really, really interesting shapes that might intrigue you or inspire you somehow. The tool that I wish it could have, maybe a mirror tool that was... In this case I can... Even if I wanted to have a normal character, I don't think I would be able to do it because I don't think it's possible to make both sides the same just by hand, manually. So, I guess it would be handy if it comes in a symmetrical form and I just did half the work.

P09: I don't think I really have anything to add. Like I think what I really... The same, like I think what I loved about it was also what was challenging about it, so I'm like, nothing to add. I love that it

will just never be symmetrical and, yeah, it would be really useful if it could be symmetrical, you know it's weird, like. So, nothing useful to add there.

KHN: It's an interesting contrast there.

P09: Libra.

KHN: All right, I understand. [laughter].

P09: Yeah. It makes sense now. The foot makes sense.

KHN: So, the more specific question that I have is about... I noticed at various points those of you who were sitting next to each other would end up with similar characteristics for a little while and I think you talked about like making the ears the same, [P07], and, yeah, can you talk a little bit about how you figured out how to do that? Like did you talk to each other about how to make it or...?

P08: Well, when we did the one together, we did something with the ears and we made them a little bit bigger. But then, when I was doing it on my own, I managed to stretch them out even more. And you did as well.

P07: Yeah, I did.

KHN: So, you were kind of going off your experience in the group work.

P08: Well, I was just trying to make things like protrude from the head, really, and I thought like the ears is the only thing that I can really stretch, so that's what I went with and I was going to do it with the nose as well but I wanted it more like coming from the head but this was really tricky. So, I just did... That's why I pulled the ears out like that and then... and then I kind of liked the shape that it made as well.

KHN: Yeah. So, you didn't like talk to each other about doing anything.

P07: No.

P06: I didn't do anything with my ears.

P09: I did.

P06: Yeah, they were very cute.

P09: I thought so too.

P06: On our first one we tried to do stuff with the ears and we sort of smooshed them and I think one of them we managed to turn the ear, which was quite cool.

KHN: Cool.

P06: Yeah, that was quite cool. But I don't think... Because it wasn't, the ears weren't on my plan, so I didn't do anything with the ears. I was just trying to get that cone of the head.

P09: Yeah. We didn't really talk during the second one.

P06: No.

P09: We were kind of absorbed.

P06: Yeah.

P09: It didn't feel like there was so similarities in our second ones.

P06: Yeah.

KHN: **Yeah. Did you feel like you carried anything over, like you both learned from the...?**

P06: The cone head.

P09: Cone head, yeah.

P06: That was my big thing, my success story. But I think we were trying to do opposite things in the second one. You were trying to kind of go with the flow and see what came out of it and I was trying to control it and it wasn't working.

P09: It was a test, wasn't it?

P06: Yeah.

KHN: **I mean, yours were definitely more similar for a little bit, when they would zoom in on the face. Like I looked over at one point and you had the same ears and I was like how did you do that. It was very cool. Yeah, no, it's very interesting, hearing what carried over between the two sessions and where you got stuff from.**

So, the last structured question I have is I know the survey for the workshops we had you talk a little bit about whether you've used any like character creators in games or similar software, before, and, if so, I guess, like what has your experience of those tools or your perception of them, if you have ever used them. Like how do you think of those kind of tools and how do you think of...? How do you think of this tool in relationship to those? Like in terms of what you can get for output.

P06: I suppose I found this one quite hard to use but I also find some of the other ones hard to use and I think it's... Like for me personally it's the detachment between the computer and like mouse/keyboard and seeing the screen and the figure. And I think also because they're quite sculpting-based which is something that is not my sort of area of skill. I find it harder to do sculpting and... Especially human sculpting, I find it quite difficult.

Like if it's a completely fantastical creature that doesn't need to look... like have any resemblance to anything, then I think perhaps I would find it easier. But when it's human things, I do find it difficult. But I do find the detachment between the mouse and the keyboard and the screen a bit... It's not like a pen and paper. Like even in like the virtual reality things we do now because that's the same as just

like drawing in 3D.

So, it's much easier to... It's like, oh, I want that in a bit. I just put that in a bit. Whereas this is like I need to find the tool and know how to use the tool to get the reaction of what I'm trying to do. So, yeah, I think I find it more... a bit tricky to use.

P07: Yeah, I was more thinking about the... Yeah, there was the navigation as well. Like just in terms of the other software, there's a... Their navigation system is similar and have this kind of... you know, a changing box or you have kind of shortcuts where you can just navigate more seamlessly. So, you can sculpt it easily, I guess, instead of a front view and side view. There's a quarter view I actually want to look at and some bits I agree. The thing with the chin. We were sculpting together and there was a chin bit here, it was like a fish, and we want to get rid of it. The front view and then the side view, it was quite... a little bit hard to get rid of that bit. So, yeah, that was the difference, the navigation part.

P06: Yeah, I think what's happening on the other axis, the one that you can't see is... was quite... It was quite difficult to know what was going on there and I guess you can't hold the thing that you're doing and have a check and then come back and say, okay, yeah, that's, yeah.

KHN: **And in terms of the kind of output that you're getting from it? Like how do you perceive what kind of... the universe of possibilities that you can get from other character creators or human creators that you've had experience within games and, yeah, say in software like this, 3D software?**

P09: I felt that... So, I had very limited experience, mostly just with games, creating avatars, like quite simple stuff. And I think what was quite interesting about this system was that it felt like I recognised myself a lot more in it. Like I thought like I recognised like different kind of iterations of myself and people I know and like there was a lot more kind of like, okay, that could be me like...

And I've never really felt that kind of... And also in its randomness. Because I feel like that's a big part of being trans. It's like, well, it's very random, actually. Like how the body changes with hormones and like it is all just a little bit like, oh, I guess that's happening now and I thought that was quite... I felt quite represented in that, with this kind of slightly liminal space of like, oh, okay, that shoulder's doing that now and I thought, yeah, it felt really... Like I recognised myself a lot more in it than I have in game/avatar-making.

KHN: **Very interesting.**

P08: Well, I never used any such software before. I just... Yeah, so this is my first time ever trying it and, well, I really enjoyed it, so I would love to spend more time to experiment with... I think maybe if I got more used to the controls and... You know, maybe the more you use it, the more you would understand like if I do this it's going to do this. I don't know if that's a limitation in the software or if it's like coming from me not being used to using it as well. And then, yeah, I'm sure...

But I like the sort of randomness. It just creates like new things that you didn't expect and... Yeah. But

I think I wouldn't really enjoy using it if I had something in mind that I had to create and I wanted to create a specific look and then that would be a bit frustrating, with the way that I use it now. And also I paint, so I do things in 2D and so I think this is another thing that... Yeah, it would help if you were a sculptor maybe and you would understand a bit better the three-dimensional anatomy.

P06: And like where to take things and where they would carve bits and make it look authentic. I was just thinking like, oh, I need to chop a bit here and kind of seeing what happened. And yet the output I think is similar to other software. Because I think the... Like the person also needs to have the skill to be able to create something in it. So, yeah, I didn't quite have it. So, it would be like similar in other things.

P08: But I think definitely it would be more... It would be really useful to have like kind of a window-shrink, the other angles could shrink and you could see the volume in front so you could see what was happening...

P09: And also a little more subtle response. So, it wasn't you had to click and hope but more that it actually... The graphic moved with your movement. That could be maybe easier, also to get a feeling of whether it's squeezing or stretching or doing whatever it's doing. Because that is the easiest, the joy of randomness, that you're not like, ah...

KHN: Do you have anything to add?

P07: Yeah, actually I agree with the randomness and I think that's the bit that you can always get this originality in... individuality, whenever you're creating a character. It just comes out never the same and you can sort of give a go and let yourself in and then give it up and then you always, yeah, have some surprises. So, it's very good.

KHN: Cool. Okay. Do you have anything to add? Just generally as a... using the tool, the workshop.

P06: I think the refresh, that's cool.

P09: That's so cool.

P06: Yeah, it's nice because if you don't go in with an idea, then you could really create anything. It could be inspired by the new refresh that's popped up. So, that's quite cool.

P08: And it's like telling you what it wants to become.

P06: Yeah.

P09: Quite forcefully. Unrelenting.

KHN: All right. If no one has anything else, we can stop there. Any burning comments? No? Fabulous.

Post-Workshop Group Interview with P10, P11, P12, and P13

21 January 2020, Hatcham House 1, Goldsmiths Campus

KHN: Alright. So, my first question is whether ... and I think I've heard some of the answer to this from some of the things we've said to each other. But whether, like you wanted to created kind of change over the course of the day over the course of using the tool. And if that is the case, in what way did it change?

P12: Are we going in order, or just ...

KHN: Oh if one of you feels ready to start, you can go ahead.

P12: I felt certainly there were changes from what we tried to do in the first situation. Like learning from that. Like not being able to sort of expand the torso in the way that I wanted to and that the first creature kind of meant that I didn't think of doing that in the second. And it became more about learning the kind of, the ways in which things could easily be exaggerated. So, like length of limb and stuff like was a lot easier to do than to bulking up body parts.

So, I'd say, yeah, that that certainly came into effect to me that software sort of guided that decision.

KHN: Yeah, you felt guided for what felt easy within the tool rather than ...

P12: Yes, I think so. I mean just kind of what I knew how to do, you know, kind of what was ... how to accomplish the software.

P11: It was kind of having the expectation of making the second design cos the first design which is premature in anything, because I couldn't replicate the picture. I can't speak English so I ... but the second one it was definitely like kind of working off of like, I know the tool is capable of this, I know the tool is capable of making a strange lumpy body and things like that. And like, how I can play with that and how can I experiment with that with waves.

Well, I feel it was successful and certainly motivated to continue rather than getting like really frustrated. Cos I think it's something that's obviously we all, can't realistic do at this moment.

P13: Yeah, I think I did the complete opposite. And that's I mean about halfway through that its trying to do something which it couldn't do. Like I went more with what I would want to make which would be something which is more animation wise. You know, a rigid [s.l.] body, but with movement and with, I dunno. And then because I think I didn't do what you guys did which is what the programme tried to force it do, and I wanted to do, it didn't do it. And then I got frustrated with it because it wasn't doing what I thought it should do rather than working within the constraints. But yes, which would have been the smart thing to do I think.

P10: I mean, I know when I came up with the design, I was thinking of the feeling of when we were trying out the tools. And I did look at it more as just a way of going through each tool and seeing

where it led me rather than it actually having anything in my head as a sort of final design.

KHN: [long pause] **And if there was something that you could include in the tool that wasn't there and that you didn't see, or that you would have found to be creatively, or effectively useful, can you ... do you have an idea off the top of your head what that might look like?**

P10: Well to be honest, I don't think it was even an issue of the tools themselves. I think the issue was the lack of response to what was you know ...

P13: Happening, yeah.

P10: ... because its ... because actually all those tools are perfectly reasonable to use and would give you a good result if they were more responsive. I do think the model itself was not good and fundamentally flawed.

P13: Yeah, I think it also be just the effect of the tool on the body was not clear about ...

P10: Yeah, well, yeah.

P13: ... well it wasn't clear about what was happening and then what control you had. There was no ... I couldn't ever place, oh you can do this, this and this, that's that creates that result, but do this, this, that creates that result. It seemed to be completely random and that caused a lot of frustration I think, because it meant that I couldn't map out or even be creative. It was just kind there was it was almost just wanted me ... made me want to give up because I just ... it felt like it ... there was no way I could achieve anything from it.

P10: Yeah, it's hard. Because you could also make ... you could make all the changes with the body, but you couldn't really change the face.

P13: Yeah.

P10: And that's kind of an important part I think of, you know, if you're creating a model yourself the face is the face, you kind of need that.

P13: Yeah. I think also, with the 3D thing, just having front, backs, right and side, the side to the front isn't really how ... That's a very almost set design way of flattening things. Actually, flat and hard.

P10: It's static. It's very static.

P13: It's very static.

P10: Yeah.

P13: Whereas you'd want modelling in 3D you need to be able to pan around it. It means you'd like to see it from all angles, and it has to be this organic movement. It can be, especially even the body which is not straight lines. It's never ... well it hasn't any straight lines. And there aren't any straight lines in nature actually. It's all kind of ...

P10: Yeah, that's right.

P13: If you're doing something organic, you need to be able to, I think, isolate certain areas as well. And if you could maybe grab a certain area, isolate it, change it, go into different level of the body construction. So, go bone, muscle, fat, so you could go in and change that and work your way out. You know a lot more control with how bodies ... how you change the entire thing rather than straightening one limb and then at all crushes up and then it's all very ... Its I think, it creates an odd ... its ...

P10: It's an odd way to view the body ...

P13: Yeah it is in a way, its ...

P10: When you...

P13: ... it's just not good.

P10: You couldn't ... you know you can't access the joints. And that's ...

P13: Anatomically it's a very odd way of modelling. You know even if, if you were to look at it from the sense of just sculpture, so how you form clay, then you would not want to isolate. Then you'd want to go completely the opposite direction. Not have any of the ... you just have a lump of clay that you then push into.

P10: Yes, I see. Yes.

P13: And then all you need to do is push ...

P10: There's another way of doing it. Yes.

P13: ... and the other way of doing it, so you wouldn't need to have like the head, this is the body and the feet, cos that doesn't make sense. You'd be use up two tools which is push and pull maybe sort of like an etch or something like that, and look at it from an artist's perspective in sculpture or in clay which would be cutting, moulding ...

P10: And then you don't need the internal structure, you don't have to think about that.

P13: Exactly and just thinking about it in the sense of a very organic moulded thing that you then push into and create something. Does that make sense?

P10: Yeah. Yeah, yeah, yeah, yeah.

P13: So, that's ... that would be the opposite way of seeing it I suppose, rather than structural artistic.

P12: The thing that they've got ... so both those approaches are reliant on sort of visual feedback you know and that was really the difficulty that I had with it, is that the visual feedback wasn't immediate. And like, I'm sort of aware of the fact like it must be quite a complex computational thing

to accomplish.

P13: Yeah, absolutely.

P12: But sometimes like, for me, like the common ... the two things in tandem where there's a sort of lack of visual feedback and a sense of consistency. And then you either in terms of the interactions, not knowing whether up meant more or down meant more or left or right.

P13: Yeah that was I think, every ...

P10: Yeah that's right.

P12: And that doesn't necessarily even need to be like reflected in what's happening, but some kind of visual map of that would have been really helpful.

P13: Yes, cos sometimes, yeah, sometimes you might have them a bit isolated. Cos some to extent you have a sliding bar which you then do left, or right, down separate rather than an arrow which is very abstract. Like it's just an arrow on a body is very abstract. You don't really know what the point of reference of making it larger or smaller is. So, if you wanted to make something larger, if you just want to be able to external the tool. Yeah, just like it, which is obviously about scale rather than movement. Does that make sense?

P11: It's like the only like about like the centre point, cos I would do the same kind of movement, but it would give me two different results.

P13: Yeah, yeah.

P10: Yeah.

P11: It was like the same distance and the same location, I can only think that it's like it's the centre point inside the object that I'm moving is altering it as I move it. But I just, I didn't have a point of reference as to knowing how it was changing in respect of my cursor. That it was altering the way that develops. So, that was a little difficult, that you can like, so if you could like kind of locate where it's going to be in proportion to it would help give some sort of expectation as to what's happening I think.

P13: Well that, there's the tool, there's the puppet warp tool in Photoshop which is basically you create locus, like loci, or whatever. Like so you put points on the thing, and then you walk around that. But then acts ... that gives you points of reference which you move the whatever it is in a certain direction, then that makes sense. Whereas it was in ours, it's just an arrow you're dragging around. It's just there's no point as yeah, you just can't. You don't have any control over what you're doing. You don't know what you're affecting.

And also, I mean if you think about in terms of if you want to break up the body up into separate things, then cursoring [ph] over something, which I then, like sort of putting in a colour, and you know that that's what you select. Because otherwise there's no way of knowing what you selected is what you selected. Or if you selected it all. Cos there's just there's no ... there's... it doesn't tell you.

P10: Yes, that's very important, because when you said, the pink areas from the areas that are pink, they're the ones you can work on. Because like, we had no clue that that was case. And actually, those pink areas are different, whether you're in ... which mode you're in. Whether you're in low, medium or high. You know and those are things that need to be clarified.

P13: Yeah, essentially.

P12: There was another really, minor which I found is not knowing which ... not remembering which tool I was in. And even just kind of having that remaining highlighted I think that would be useful for...

P13: Yeah, yeah. Absolutely.

P12: Even having used the software for a while I'd sort of ...

P10: Yeah, you forget, wouldn't you.

P12: ... and I wasn't quite sure what interactions to expect.

P13: No, definitely.

P10: And also, the funny thing, and I know this is one is kind of neither here nor there really. But I'm righthanded and my instinct is to go for tools on the righthand side. I mean I know the fields goes to on the left hand side, but my instinct is always to go toward to reach to the right to bring a tool in.

P13: Makes sense.

P10: But if you're lefthanded it doesn't work for you. Yeah, I mean, I recognise that, but it's just yeah. I mean is that in many programmes ...

P12: Yeah.

P10: ... it's on the left hand side.

P12: Yeah, it's to the right. Photoshop and Indesign.

P10: Right and right.

P13: Yeah, I don't know.

P10: If the majority of the population is right handed.

P13: Yeah, true yeah. Its, we don't have information, or the object information on the righthand side, and tools on the left which would be, it make more sense, because you read left to right. So, the information on the left would make more sense ...

P10: Yes it would.

P13: ... having the tools on the right.

P10: Exactly.

P13: Cos that makes sense.

P10: Because you would just ...

P13: And you're moving and you're grabbing ... and grab it and then it makes more sense for you to do ... read, grab ...

P12: It's crazy.

P10: Okay. Who is righthanded in the room?

[show of hands] [laughter].

P10: Yeah, we all are.

P13: Yeah.

KHN: **Statistically, it works out.** [laughter].

P10: I mean what we're seeing is that there's a habitual thing that we'll get used to using it and whatever it is ...

P13: Then want it in a certain way.

P10: ... you're used to it. So, I guess consistency is worth looking at. And so, in a sense, I'd be looking at you know what ... how this reflects other programmes that out there. And can you slide into it easily from something else.

P13: Yes. Yeah, very important.

P10: Yeah.

P13: Yeah, like ...

P10: And Tilt Brush. Has anybody used Tilt Brush here?

P13: No.

P10: Well again, it's a VR software, but it's incredibly well designed from you know within the oculus [s.l.] print set. You have you know your hold your ... your maybe, which swivels and does all kinds of things. And you've got your pointer with the righthand to control.

P13: Well I ...

P10: Well if you're lefthanded you just clip it together and you do it the other way around. So, its you know, its massively easy to get into.

P13: That's really cool.

P10: Its really well designed. Yes. It has your menu which swivels and does all kinds of things, and then you've got your pointer, with a right hand control. But, if you're left handed, you just click them together and do it the other way around. So it's massively easy to get into. It's really well-designed.

P13: Cool. I should look into that. So, its Tilt Brush?

P10: Tilt Brush.

KHN: Which aspects of the tool did you feel like you used the most and why?

P13: I grabbed just the one to push and pull. Because it seemed to be that, I didn't know what the others meant actually ...

P10: The others weren't reactive.

P13: Yes it was very reactive, and I didn't actually know what collect was. I didn't really understand what that meant, or add, the words were a little bit confusing. And also, push and pull is very common to other programmes like Sketch Up, it makes sense cos it is just push and pulling and moulding. So, it's a sculpture. It makes the most sense to use those two. Whereas the other one, it just threw me quite a lot and I wasn't sure what it meant. I suppose the decision ...

P10: Squeeze and loosen, I didn't understand those.

P13: I really ... I honestly I couldn't get my head around what that was doing. I was ... I yeah, I tried it a couple of times. It made my model fat at one point, which I was like, wish I'd been making Tony, that would have been perfect. But this guy was supposed to be skinny, and I was like, fuck's sake.

P11: And there's a tendency to gravitate towards curve/round, but I think might be a symptom of the two models that I made personally. And I think as much like my hands response was push and pull, I kind of knew where I was going with it. And I felt the most confident using that one. If you're on push and pull sometimes I would do something, and I would get something crazy. Like I don't know, I'm going back to curve-round.

P10: Especially if you did it in the low density mode, with like push and pull which has changed the whole thing ...

P13: It does the whole ... yeah. Yeah.

P10: ... massively. So, yeah.

P11: And then with it, I did finish still not knowing what move meant, other than like looking like my model got hit by a semi.

P13: Yeah. Yeah, yeah. I think that was a really poor assignment. Cos that's I suppose that's the only thing, if you think about it in terms of, you are changing how long a limb is, but if you can't then make them move in or change ...

P10: Yes, that's right.

P13: ... in the role, the space in which it resides, then it means that the whole body is strange. And you are very limited in what you can create, cos it's all just gonna ...

P10: Just going to bend in.

P13: Just go and do it, rather than trying to move a limb, and then moving that out and then sort of thinking about it. That way around.

KHN: I feel like we've begun to cover this. But which aspects of the tool did you find particularly difficult and what would you change about them, apart from what you've already said?

P10: The answer is, the responsiveness. The responsiveness. That was the key thing more than anything else.

KHN: Okay.

P13: I think that what I found slightly odd was that you had all those gridlines around the body, which I couldn't affect. And it sort of made me ask why those gridlines were there. Because if you have ... well I bring, I you know, take you back to the pivotal [s.l.] tool which is basically it creates loads of gridlines that you can add locus and then manipulate each line. And then that gives you a lot of control over what you're doing. And sometimes it throws you off a bit and you have to add all the different locus so as to be able to do that. Or, I don't even know what they're called, but points of reference. But I didn't understand what those lines were there for, if I couldn't affect them.

P10: Yes, that's right.

P13: You know, it was sort of like, well is this a visual reference, in which case yeah, it sort of seemed a bit, I dunno, I'm not sure why they were there, I guess if I couldn't affect them.

P12: I can't remember, did they scale consistently?

P10: No. I don't think so.

P13: No.

P12: I found the same. One of the things that I found a bit frustrating about the interface was the fact that the camera reset on whenever you changed the angle. There were points at which, say for example, you'd be zooming in on a head and you sort of wanna check the side view and see how the move you just made affect things. And it just resets back to the full body. Whereas being able to kind of flip back and forth between two close ups. You know, 3D is difficult because you, ideally you do want both options you know what I mean. Like a, one view to say wide and one to be a close up. And you know, toggle in those would be useful.

P13: Yes.

P10: I also, I mean I don't understand why the genitals were included to be honest. Which is not a tool question, well ...

[laughter]

P10: I'm sorry. Sorry.

[laughter]

KHN: Well I mean, can you say a little bit more about that?

P10: Well I just didn't see the point of it. Because the ... it was ... it's so impossible to get any level of detail and that one would want on really sort of basic physical structures, having the genitals there didn't affect anything either way. You know, I think if you wanted to include something you could have a patch that you could grow or shrink and do stuff with. But as it was, it was like, it seemed provocative for no good reason.

P13: Yeah.

P11: I remember trying to do something to the genitals and then not succeeding and just back to the face, you know.

[laughter]

P11: I wasn't focusing on it, and I was like, I'm not sure what's going on and I don't really mind anyway, so it's just kind of there.

P10: But it just got funny lumps and yeah, like even in this, the tummy point on the tummy, here you can...

P13: I suppose like one of the things that I've noticed in other programmes, I think what is really important when you're working, well even trying to put the indication of something, is really is light, and how you change the light source and then how light falls, it affects how you see a 3D object. And so having that in any 3D program is really important when it comes to rendering or when it comes to making it look pretty and working with it anyway. And I suppose not having that meant that actually visually it flattened it. It was quite flat, and I suppose that's why you had the gridlines. But when you rendered it back, it just became this sort of fleshy moulded like thing. And I think light is quite important if you're creating anything 3D.

P12: There can be quite distinct processes though in respect of the different programs, how they break it down. It looks ...

P13: Yeah, that's true. They do. They do it later on.

P12: ... like this is kind of like the modelling section and all of the other kind of things.

P13: But like that light will help you model I suppose, or sort of figure out how, you know, if you were to be ...

P12: Yeah. Geometry and all those things.

P13: Yeah, yeah, I suppose it can give you an idea of what it is you're looking at and how perspective wise what the scale is. You know, I suppose that kind of stuff would.

KHN: [long pause] Sorry, this is my personal camera and I always have to check in on it. So, I noticed that a lot of you seem to be struggling with how to make specific things happen. But, that wasn't ... you didn't then articulate that to me as a question directly. And I guess, I'm interested in why, you know, if you were trying to make a part of the head change like this, I guess I'd like to know a little bit more about what was going on for you then.

P10: Well I would have assumed, I mean, to being with I assumed I couldn't do it. I normally would, if I pick up some tech which I don't know, I assume I'm doing it wrong. And its only when I was looking at everybody else, I was thinking, oh none of us can do this you know. And that's yeah. And I wouldn't, if I were doing something, I wouldn't expect to have to ask a question that basic given the skillset I have already.

KHN: Yeah.

P10: I wouldn't expect to have to ask you, oh how can I do this, I want to think, I can work it out for myself.

KHN: Right.

P10: So, yeah, that is one of those things.

KHN: Okay.

P13: I think I thought, I could figure out how by playing around with it. That's like, cos that's normally how I learn. I just ... I often, I taught myself to draw, I taught myself. I'm not actually educated in that to be able to draw or in software. So, I would just, I go through the tools, and would always figure is there is something wrong, that's explaining the toolsets, but not how to use them really. Its just what the tools are. And so, once I know what the tools are, its I know how to use it because you play around with it. And I'd be, oh I get it, I can do that now, it makes sense, this interface makes sense to me now. And then once you know the interface you can solve problems.

P10: Yeah, interesting.

P13: But if the thing isn't responding ...

P10: Yeah, right.

P13: ... then I can't figure it out because I don't ... like there's no logic and there's no method to the madness that's going on in front of me. And so I can't figure out what the tools are doing, which I think leads to frustration very quickly because you're, you can't see the issue.

KHN: Right.

P13: If you know what I mean, you can't see the problems to solve it. So, it's about assuming that you're the problem. Oh okay, that's my problem more than ...

P11: Yeah, and I actually feel like, no, in secondary school anything like that, and I pretty graduated

and like managed to like, con my university into letting me show up and work every day. So, I'm quite used to like not having as good of a grasp on anything else, as anyone else does. I walk into like the clay city and like this all means nothing to me. But I'm quite good at like, just sitting and figuring it out. And I don't mind clicking through, going in a lot of detail ...

P13: Right.

P10: Yeah, yeah.

P11: ... and going through every single tool. And like that doesn't bother me. So, I feel like maybe I was not that frustrated with the tool, cos I'm quite used to like walking into a room and not be sure of what I'm doing but figuring it out over time. And that's how I got to that point, but then it just, especially with the last five minutes which I got to this point where I just couldn't quite push it to the point that I needed to anymore. And like I kept kind of like rotating through all of them and going, okay I can't do the drawing right now, but that's fine, I'm gonna go and do this leg. And then have like these lines excessive and then having these things that I would just get so stuck on, but I won't ask anything. And I feel like, okay I'm gonna be proactive about it, cos that's just ...

P13: Yeah.

P10: Yeah, that's true actually.

P11: ... do something else and come back to it and see if I can like, from what I learned with the next thing, will I understand. But that's it, I just didn't towards the end really.

P12: Echoing, you know, the sort of self-starter ethos and I suppose that quite with new tools, you sort of play around with them to see what they can do. And it's sort of, it's rare that I will pick something up with the ... in the way that we did here with a specific objective in mind. It's more like, oh, look press that and suddenly the head slide is just big. Like that's quite interesting. It's also, just shyness. You know, room of strangers and kind everyone does that [imitating mumbling]. And then perhaps more than that, not necessarily having a clear sense of the question that I wanted to ask. It's like ... kind of like, how do I make it not look bad.

[laughter]

P13: Totally.

P10: How do I move my fingers?

P13: Yeah, how do I not be shit at this.

P12: Yeah.

P10: Yeah, how do I move this about the screen.

P13: Yeah, that's very true. That's a good point. I don't know what question I needed to ask in order to get the result that I wasn't sure what ... I wasn't ... yeah, maybe it was partially not really

knowing what I wanted as well, or not knowing what it was ... what the limitations of the program were, so I wasn't sure what I could achieve. So, I wasn't sure of what question to ask cos I wasn't sure what it was I was trying to achieve.

P10: But also, we are all people are used to trying out the whole tool, the options our selves until we come up with the solution. We don't think, ask the question first.

P13: No. No. Maybe we should, yeah.

[laughter]

P12: Yeah I suppose we all could.

P10: There's a lesson for you.

P13: Yeah, good point. Stubbornness.

P10: Well it's like if you go to school now and if you have a question for the teacher they'll often just say, Google it. You know, we're the ... you know, that's what we do.

P13: Yeah, that's very true.

KHN: So, there are definitely other systems that model human figures of various you know stylisations and models of reality etc., and I guess, I'd like to know a little bit about what your perceptions of those kinds of tools was before today and how that compares to what you've used today.

P12: I've played around with Poser before. There is a ... there are communities based around those ... that software which are really creepy and weird. and I don't like even admitting in a room that I use Poser, [laughter] cos its, they're really odd bunches of people.

P13: What is it? What is it about?

[laughter]

P12: Its basically, I mean it's like this, its figure posing software and you get like there's a whole after market in terms of selling clothing and props and sets and all these sorts of things. And people often use it to indulge in their fantasies in terms of ...

P13: Oh!

P12: ... either making pornography or like ...

P13: I see.

P12: ... anime style characters and stuff like that.

P13: How interesting.

P12: Yes. I mean its ...

[laughter]

P12: ... quite an extensive sort of subculture. I would like to stress, my uses were legitimate and not ...

[laughter]

P12: ... illicit. There's kind of, I dunno, its sort of software like this is, yeah, its kind of niche but also a bit more accessible than a lot of kind of high end 3D packages. And its sort of easier I think for people to understand, oh there's a figure and like there's a doll and I can pose, then I can dress it up. I've also used like I think there's an open source project called MakeHuman, which seems more about sort of generating geometry than actually posing.

And I mean, the sort of positives of posing particularly is it quite kind of friendly interface and its quite responsive and you've kind of got a track ball for moving the camera around and stuff like that. But it is also like, it is also difficult to use. Like you can pull things and the whole body like twists out of shape in the kind of same way. And like there isn't ... I don't think there's been a sort of definitive interface paradigm that's really kind of solved it if that doesn't sound like a really pretentious phrase.

The best thing that I've actually seen was a video of someone who had basically like a Barbie or an Action Man figure, and they were posing it and the software on screen was matching it. I thought that was really smart. I've talked enough now so.

KHN: Yeah, I mean do you feel like there are sort of limitations to what you can get out of those kind of tools, if so, ...?

P12: Yeah. I mean that they often feel sort of weightless and not, sort of just in that sort of creepy uncanny valley of not real but sort of ...

P13: Not quite there.

P12: ... exaggerated enough to be sort of interesting and fun. Yeah, it's kind of, it's sort of it's a really weird middle ground between realism and caricature.

P13: I suppose it depends on what you want the program to be used for as well. Like, if it's for something which is like a real stick depiction of a human being that's just standing there, then I think you probably have to go anatomical and have to think about the skeleton, muscle, fat and how tendons and how things are put together, and probably have a building block of different forms of those things and then how you put them together. Or, you go for something which is, yeah, I suppose more about animation which has got movement and force and gravity and that sort of eminence that I think would be very different in terms of, I suppose it would be a very different interface.

I've never really used this kind of interface before. I have a lot of friends who use Houdini and use sort of 3D modelling software. But, I've never used them and Maya and all that kind of stuff. I've used things like Vector Works but that's all for building construction too. It's not real organic forms.

I think that would be different, I think.

KHN: Different to those other programs you described, or different to what you saw today?

P13: Well, as in I think that Vector Works, Sketch Up, or Autocad are for construction sort of in buildings .

KHN: Right, okay.

P13: So, its straight lines. And well you do have organic form as well, but you tend to not, it tends to be sort of more mathematical and geometric. And I think organic forms might be sort of trickier to do that with. So, hence, why maybe it's a bit messier when it comes to the tools that you use. But yeah, I suppose it depends on what you wanted to get out of what you wanted people to use it for.

If you're just creating an avatar, then I suppose it's sort of, yeah, you'd have to maybe go more anatomical. But then I have friends who work in the gaming industry who dress up in the suit, take a picture of them moving or something, and then they add on top of that. Which is actually much better because you're getting its more accurate, and you tend to have all those hidden things like the movement and the force. And I mean, cos I mean you can draw a person like this, but no one actually ever stands like that. No one ever actually is. There's always movements right. Even if someone's just standing there, there's always this, there's always more weight to certain people in certain areas of the body. And that's things that the eye see. And artistically speaking that's what artists capture. But that software doesn't and that's why it looks so odd I think.

P10: Yes. Because it's also got no ... it's like, even the sort of culture references within the body, it's like, you know people don't, as you say, people don't stand like that. And I've never seen anybody who looks remotely like that. And you're almost better going with sort of more sort specifics, more ethnic specifics then.

So, for example, the head shape. You know, who has a head like that? Nobody. And yet you have to, you know if you were designing say, you know a figure for China, you would have to think in terms of head shape of course which is quite different. And body to head proportions are all different stuff like that. Limb proportions.

And this seems to be, yeah, it's just like somebody made a doll and with no reference to ...

P13: A human body.

P10: ... anything.

P13: Well it's, I think also, what's so interesting when I saw it, was a really great series on anatomy of the artist called by Rey Bustos, whose this American dude who is really great. And he sort of talks about signposts within the body that you can rotate around. So, there are certain aspects of the anatomy that you can always pinpoint in every body. They change, but even so, like the sort of here and the hip bones ...

P10: Yeah, the shoulder-hip thing yeah.

P13: ... here, here, like all these things are aspects of the body that tend to be consistent within human beings ...

P10: That's right.

P13: ... to a certain scale. And then you rotate around those signposts or those, the northern star I suppose of course like in the sense of like, you can then tell from where the nose and or where the lips are. And that's what your brain does. You map out the body according to where you see these signposts or where these sort of specific locations are. And that's kind of how you make sense of the body as a 3D object. And this didn't seem to have that.

P10: No. And it's even then just about the recognition of bodies, where they, you know as human beings, we can identify gender before any other thing. Gender and race, you know, well within the sort of Asian and non-Asian, or Chinese-non-Chinese.

P13: Interesting.

P10: But colour is not identifiable thing at a distance. We're talking at a distance, those are things because you see the size of the head in proportion to the body and you see hips, shoulders and that's it. They are the two identifying things, the first identifying things in identifying a human body.

P13: Yeah.

P10: So, yeah. So. Tricky. Gosh, I hope the feedback will be of some use to you. Might as well just pull your hair out, you know.

KHN: **Does anyone have anything else to add?**

P13: I don't think so, it's been interesting though.

P12: I don't know how much we can ask about the project. Like what is its intended use or does that compromise it.

KHN: **Well, its, even if it did sort of compromise it, we're basically at the end.**

P10: Yeah yeah yeah, sorry.

KHN: **It's intended for creative applications. So, for artists. It's not so much of a gaming tool. It's not ... yeah.**

P10: Well yeah, the anatomy aspect then really needs to be worked out. Big time.

P13: Yeah. Yes. And yeah.

P10: Cos I actually did train as an artist. And I take anatomy, all the kind of varied details from stuff like when you're modelling the human body and you do ... you measure with callipers when you do your calculations when you work in half size, quarter size, whatever.

P13: Yeah, yeah. Absolutely.

P10: Which is an ... you know, it's not something I use, cos that my work isn't like that, but it was an incredibly good discipline. You know, and you do learn about the meticulous construction of the body. And so, this would not count. No way.

P13: No, it's, yeah. Anatomy is cool as well. Just how the body is put together. It's amazing how its put together. I just remember, so I was watching these videos with Rey Bustos, what a dude. He just talks about how bone structure is speaking now. A triangle, because that's most ... the strongest geometry. And it goes to all the masters, the induction masters and how they ... That kind of stuff is so important and interesting cos you ... and you can go back and he talks about how hilarious the babies are, cos they're all to scale basically men, and they look like if ... they look they'd throw you across the room and a baby doesn't look like that, you know, but that's sort of like how artists have changed and how we sort of you know translated bodies.

P10: That's right.

P13: And...

P10: And who had whom to model. Like Michelangelo had male models generally and his women look like male bodies with breasts put on.

P13: Yeah, yeah.

P10: Sometimes there's a bit of tapering of the thigh, but not actually so great as female forms.

[laughter]

P13: Yeah, I mean, there's the Blake Exhibition on at the moment at Tate Britain which I went to. It's really good. It was so long, it's a lot ... its comprehensive though, but it's interesting how he has done all these. All his figures are very weirdly proportioned. And he doesn't really paint them like a lot of people. So, then lots of created scenes so people behind them are massive. If you look at how big the hands are compared to the body, and it's just absolutely mental. But still fascinating in terms of what I suppose was acceptable or seen as an anatomically real at the time ...

P10: Well that's right, yeah, yeah.

P13: ... in art, compared to now.

P10: Yeah. Although you know, often the intention wasn't to be anatomically correct.

P13: No. No, no, it wasn't.

P10: It was the you know, ...

P13: Gesture.

P10: ... human being as a cypher, as metaphor for ...

P13: Yeah, absolutely. Very interesting.

KHN: Any other comments?

P13: No.

[laughter]

**APPENDIX E WORKSHOP STUDY: CREATIVITY
SUPPORT INDEX SCORES**

Number	Collaboration1	Enjoyment1	Exploration1	Expressiveness1	Immersion1	Effort1	Collaboration2	Enjoyment2	Exploration2	Expressiveness2	Immersion2	Effort2	Collab. Avg.	Enjoy Avg.	Explor Avg.	Express_Avg.	Immers_Avg.	Effort Avg.	Collab. Count	Enjoy Count	Explor. Count	Express Count	Immers. Count	Effort Count	Weighted Enjoyment	Weighted Exploration	Weighted Expression	Weighted Immersion	Weighted Effort	CSI Score	
P 01	0	10	8	8	7	10	0	10	8	8	7	9	0	10	8	8	7	9.5	0	2	3	4	3	3	40	48	64	42	57	83.666664	
P 02	0	10	9	10	8	10	0	9	8	10	7	10	0	9.5	8.5	10	7.5	10	0	1	4	5	2	3	19	68	100	30	60	92.333336	
P 03	0	1	1	1	1	3	0	1	1	1	1	2	0	1	1	1	1	2.5	0	1	5	4	2	3	2	10	8	4	15	13	
P 04	0	2	1	2	4	2	0	3	3	3	3	3	0	2.5	2	2.5	3.5	2.5	0	1	4	5	2	3	5	16	25	14	15	25	
P 05	0	2	1	4	6	4	0	3	1	1	2	4	0	2.5	1	2.5	4	4	0	1	3	4	3	4	5	6	20	24	32	29	
P 06	0	1	1	5	1	1	0	5	1	1	1	1	0	3	1	3	1	1	0	5	2	2	2	4	30	4	12	4	8	19.333334	
P 07	0	8	7	8	8	8	0	9	7	9	7	5	0	8.5	7	8.5	7.5	6.5	0	2	4	4	1	4	34	56	68	15	52	75	
P 08	0	6	5	8	9	7	0	9	7	6	9	7	0	7.5	6	7	9	7	0	1	2	4	3	5	15	24	56	54	70	73	
P 09	0	3	3	4	1	10	0	5	3	4	2	9	0	4	3	4	1.5	9.5	0	3	3	4	4	1	24	18	32	12	19	35	
P 10	0	1	2	1	1	2	0	3	1	1	1	2	0	2	1.5	1	1	2	0	2	4	5	1	3	8	12	10	2	12	14.666667	
P 11	0	3	4	4	3	6	0	3	1	6	2	3	0	4.5	4.5	7	4	7.5													
P 12	0	2	2	5	3	4	0	2	2	2	2	2	0	2	2	3.5	2.5	3	0	3	1	4	2	5	12	4	28	10	30	28	
P 13	0	1	1	2	1	1	0	1	2	1	1	1	0	1.5	2	2.5	1.5	1.5													
Average (Avg.)														4.772727	3.727272	4.636363	4.136363	5.227272		2	3.181818	4.090909	2.272727	3.454545	17.636363	24.181818	38.454545	19.181818	33.636363	44.363636	
Standard Deviation														3.386470	3.011342	3.170890	3.066831	3.371673		1.264911	1.167748	0.831209	0.904534	1.128152	12.878452	22.582374	29.547804	16.761969	22.249821	30.104801	

APPENDIX F WORKSHOP STUDY: LOG DATA

	Low-Push/Pull	Low-Carve/Round	Low-Add/Collect	Low-Squeeze/Loosen	Low-Move	Medium-Pull/Push	Medium-Carve-Round	Medium-Squeeze/Loosen	Medium-Add/Collect	Medium-Move	High-Pull/Push	High-Add/Collect	High-Carve/Round	High-Squeeze/Loosen	High-Move	Undo	Reset
P10+P11	3	1	1	3	3	14	22	12	11	6	14	8	11	12	5	109	0
P11	5	1	1	2	1	23	19	20	20	13	36	28	24	27	15	146	0
P12+P13	1	0	0	1	0	11	7	6	5	5	11	6	1	5	2	60	0
P13	5	4	2	1	0	18	10	5	8	2	5	0	2	0	0	106	0
P12	1	0	0	0	0	15	1	14	5	2	9	4	0	8	0	94	0
P10	2	1	1	4	2	5	4	16	8	2	3	2	2	2	3	37	0
P07	4	1	1	2	1	12	6	13	6	6	18	3	5	10	4	104	1
P08	4	3	3	7	0	5	7	6	7	5	11	16	14	12	4	110	0
P06	3	0	0	1	0	8	14	10	7	2	2	1	1	2	2	118	0
P09	4	0	0	3	0	19	12	27	7	5	13	6	9	13	2	110	10
P08+P07	1	0	0	0	0	16	7	7	3	4	5	2	3	6	4	11	1
P09+P06	2	0	0	1	0	9	8	8	6	2	0	1	3	1	1	8	8
P01	3	0	3	0	2	16	3	8	6	5	9	3	1	1	6	56	0
P01+P02	3	2	1	0	2	5	1	1	7	4	4	4	3	4	5	12	0
P02	7	2	4	3	6	10	3	4	8	4	7	9	5	10	5	27	0
P05 (1)	10	3	1	7	0	13	15	15	8	3	19	13	15	17	8	1	2
P05 (2)	3	2	1	3	0	8	3	7	3	4	11	13	13	20	7	1	0
P03+P04	7	0	1	3	1	16	10	7	6	6	9	4	6	4	2	116	0
P04	7	7	7	10	13	21	10	12	10	12	4	3	2	5	1	95	0
P03	3	2	5	4	1	7	1	3	1	7	2	2	2	4	4	30	7

	P11	P10+ P11	P12+ P13	P13	P12	P10	P07	P08	P06	P09	P07 + P08	P06+ P09	P01	P01+ P02	P02	P05 (1)	P05 (2)	P03+ P04	P03	P04
belly- button	9	2	6	4	0	10	0	0	0	0	0	0	0	0	0	36	12	0	0	0
chin	31	4	52	12	0	2	11	15	2	0	3	5	5	3	3	1	0	20	1	3
forehead	8	53	36	8	23	24	95	40	11	21	53	7	32	20	32	39	0	43	59	30
genital- back	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
genital- skin	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
head- back	3	0	0	0	16	2	5	11	0	0	23	11	12	0	0	0	0	0	13	1
head- top	1	27	0	15	36	2	16	23	7	0	45	7	6	0	16	15	0	29	32	6
left- ankle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
left-arm- lower	2	2	1	21	0	14	14	4	42	22	11	10	18	4	21	2	53	1	7	4
left-arm- upper	3	0	0	29	19	8	21	2	26	43	22	6	10	3	14	4	50	1	9	8
left- breast	3	25	0	4	15	4	2	11	0	9	21	20	14	0	0	12	0	27	5	32
left- buttock	1	0	0	3	0	0	0	0	5	0	0	6	0	0	0	0	0	0	12	0
left- cheek	2	1	6	0	45	3	22	6	2	13	1	13	0	16	9	0	0	57	8	5
left-ear	4	12	21	0	2	2	15	7	0	7	3	10	27	24	13	0	0	11	15	5
left-eye- inner	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
left-eye- lower	0	0	0	0	0	1	0	0	0	0	0	0	3	3	0	0	0	0	0	0
left-eye- outer	0	0	0	0	0	0	0	0	0	0	1	0	0	6	0	0	0	0	0	0
left-eye- upper	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	5	0	0

left-fingers	0	11	0	0	0	2	4	16	0	4	0	0	16	0	0	2	14	1	0	8
left-foot	11	0	0	0	0	0	0	0	0	0	0	0	13	3	0	0	0	0	0	3
left-groin	1	0	0	0	0	4	4	0	0	3	0	0	14	0	0	0	0	0	1	0
left-hand	0	1	22	24	0	2	0	0	0	20	0	0	27	0	23	1	47	0	4	1
left-head-side	0	6	0	4	12	5	11	18	0	6	6	8	7	5	7	7	0	8	15	10
left-hip	1	9	9	8	7	4	5	0	3	15	1	14	2	11	0	21	0	0	25	20
left-jaw	16	2	4	4	0	1	1	31	2	0	2	0	3	0	2	0	0	37	2	2
left-leg-lower	3	4	22	11	28	8	18	5	2	40	14	20	63	5	30	0	3	4	6	11
left-leg-upper	9	14	30	27	2	19	57	34	24	19	32	15	56	6	27	4	23	6	12	9
left-nipple	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	0	0
left-nostril	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
left-shoulder	1	1	0	30	5	7	0	5	0	61	21	0	12	3	0	0	27	0	6	10
left-side	2	4	6	3	0	0	3	0	0	0	3	0	0	2	0	18	2	0	2	11
left-toes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
left-wrist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
lips-lower	3	0	0	7	8	0	6	2	0	1	7	1	8	0	5	13	0	5	0	7
lips-upper	1	3	0	6	0	0	5	6	1	3	2	2	3	0	7	0	0	3	0	7
neck	23	10	1	2	2	10	12	37	22	1	18	4	3	5	14	0	0	2	10	8
nose	0	2	0	9	16	7	7	2	0	3	18	0	20	4	2	14	0	13	4	12
nose-upper	1	1	11	5	19	14	3	9	6	1	1	0	3	0	0	2	0	1	0	2
right-ankle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

right-arm-lower	2	2	0	55	26	9	15	0	8	17	3	9	15	10	6	14	29	1	9	4
right-arm-upper	2	0	0	24	19	6	26	4	45	32	36	24	3	5	0	47	13	1	10	3
right-breast	3	10	0	9	12	5	0	5	9	18	30	22	8	10	10	6	0	12	5	24
right-buttock	9	0	0	2	7	4	0	0	14	0	0	2	0	0	0	0	0	0	3	0
right-cheek	5	1	9	0	0	1	19	9	3	19	3	8	0	8	20	0	0	45	1	4
right-ear	12	0	1	0	3	3	22	12	0	9	18	15	15	6	28	15	0	5	13	8
right-eye-inner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
right-eye-lower	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2
right-eye-outer	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
right-eye-upper	0	0	0	0	4	0	0	7	0	4	4	0	0	0	0	0	0	5	0	0
right-fingers	18	3	0	0	0	2	13	16	0	27	0	0	13	0	13	8	37	10	1	0
right-foot	11	0	0	0	0	4	0	0	0	0	0	3	2	10	5	0	21	0	0	0
right-groin	1	1	0	0	0	2	0	0	0	3	0	5	7	0	0	0	0	0	0	0
right-hand	28	1	21	101	7	24	2	3	18	5	0	0	42	11	9	26	40	1	2	0
right-head-side	0	5	0	2	6	1	6	16	0	0	4	0	0	0	13	0	0	1	1	2

right-hip	5	10	3	40	20	5	3	4	5	3	0	9	0	5	0	9	19	1	2	16
right-jaw	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
right-leg-lower	3	5	17	13	14	14	10	10	25	41	3	28	43	3	3	0	39	11	20	19
right-leg-upper	29	17	13	48	24	81	60	3	82	27	5	18	34	14	26	9	89	14	8	24
right-nipple	2	2	0	0	0	0	0	0	0	0	1	0	0	2	0	7	0	0	0	0
right-nostril	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
right-shoulder	4	38	0	12	20	7	3	2	4	72	17	5	28	0	0	14	26	1	22	0
right-side	0	8	47	10	0	0	1	0	1	0	0	0	1	6	0	0	3	0	0	0
right-toes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
right-wrist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
stomach	50	50	323	68	77	27	10	58	18	5	6	28	8	14	1	106	110	2	20	21
torso-back	3	12	0	30	3	0	0	1	1	6	0	0	32	0	0	3	31	0	10	0
torso-chest	22	2	8	14	25	5	0	2	0	0	0	0	9	0	0	0	0	3	6	6
upper-lip	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0

APPENDIX G WORKSHOP STUDY: ANALYSIS CODES

Initial Theme Codes	Description	Sources	References	Example
Similarities and differences with current 3D human figure modelling systems	Participant responses to "If you've used or observed systems for modelling 3D human figures before today, what has your experience with or perception of them been? How did your experience or perception differ using this tool rather than previous tools?"	4	21	So, I had very limited experience, mostly just with games, creating avatars, like quite simple stuff. And I think what was quite interesting about this system was that it felt like I recognised myself a lot more in it.
Most-used functionality	Participant responses to "Which aspect of the tool did you use most and why?"	4	9	I grabbed just the one to push and pull. Because it seemed to be that, I didn't know what the others meant actually ...
Most difficult	Participant responses to "Which aspects of the tool did you find difficult? Which aspects would you change?"	4	22	Right. And also with that, to be able to know... Like often there was like, oh, this tool was working really well but I don't know what tool it is, it's not highlighted.
Creative or practical useful changes	Participant responses to "What was not included in the tool that you would find creatively or practically useful?"	4	24	During the second exercise, when I was working through the side view and I got the figure to look as how I intended to look and then I went to another view and it wasn't as I expected and thought that it would be good to have a navigator for the interaction of the views. So, if I changed in one view, I could see how it changes in another.
Changes in what they're trying to make	Participant responses to "Did your idea of what you wanted to create change over the course of the session today? If so, how?"	4	9	Well, when I came into the session from the very start, I didn't really have a set character that I wanted to make really. I was kind of just going with the flow and seeing what arose during the session and I think when we did the collaborative thing at the start, that really kind of informed what we did then in the individual thing. But then even in the individual part, my ideas of what I was doing kind of changed as I was working because of the yeah, yeah, just kind of evolved I supposed. Like I think the, when I started the individual thing I had these kind of ideas. I achieved all them I think but I think it became something a bit more interesting than I actually thought it would.
Session Specific/Similarity with neighbours	Participant responses in specific session to "I noticed at various points those of you who were sitting next to each other would end up with similar characteristics for a little while and I think you talked about like making the ears the same, P07, and, yeah, can you talk a little bit about how you figured out how to do that? Like did you talk to each other about how to make it?"	1	5	Well, when we did the one together, we did something with the ears and we made them a little bit bigger. But then, when I was doing it on my own, I managed to stretch them out even more. And you did as well.

Session Specific/Intentionality of Limb Disappearance	Participant responses in specific session to "Did any of you try to make either the arms or the legs disappear? You did?"	1	3	Mmh-hm.
Session Specific/Intentionality of Abstraction	Participant responses in specific session to "Did you both come in thinking that you were going to make something abstract or was that something that came up for you in this session?"	1	2	I think that came up in the session actually when we were talking about, when we did the drawing listening to the sound and then trying to translate that into the body form.
Session Specific/Inquiry and Frustration	Participant responses in specific session to "So, I noticed that a lot of you seem to be struggling with how to make specific things happen. But, that wasn't ... you didn't then articulate that to me as a question directly. And I guess, I'm interested in why, you know, if you were trying to make a part of the head change like this, I guess I'd like to know a little bit more about what was going on for you then."	1	5	I wouldn't expect to have to ask you, oh how can I do this, I want to think, I can work it out for myself.
Session Specific/Activity in other tabs	Participant responses in specific session to "I noticed that you two were like clicking around in the other tabs. And I guess I'm wondering like what was going on for you when you were doing that. Like what were you, were you trying to do?"	1	7	Actually, if I want to make a human for my product, to show my product, how humans use this product, I think the default position will be very good for me to use, so I can just create a normal pose, like grab, sit, stand, something like this and put my product with the human.
Unexpectedness	Themes of unexpected results or interactions which arose during the workshops	5	19	But, yeah, at the same time it's quite nice that you get some surprises. Like I did some great stuff with the head in the end and that was nice. And I love what you did with the foot.
Support for creativity in design process	Themes relevant to creativity support and related ideas, how the tool allowed the participants to express their creativity	5	68	Yeah, exactly what I said. When I first sat down I was like why would you give this type of model. But then I was like if you... You don't know what the person using it is going to do, so you give them all options and then they choose what they want.
Software tool vs other software	Participant comparisons of the tool to other software tools (general)	5	29	Yeah yeah, say if I went into Maya or other 3D modelling. Oh my God, it's different wheels, perspective from, sometimes you just miss it and you clip something, you don't know what happens. I'm not like a mature, really experienced user of a particular software because I'm constantly changing to

				different platforms so yeah, I think simple simplicity is really important, yeah.
Responsiveness	Participant perception of the responsiveness of the tool	4	16	Well to be honest, I don't think it was even an issue of the tools themselves. I think the issue was the lack of response to what was you know ...
Randomness	Participant perception of the tool as random	3	14	Yeah, I agree, actually. I like the...really like the software and it's kind of when... Especially when you reset it every time, it gets you a new character and then quite random and fresh, a new role.
Perception of interaction	Participant discussion of perception of interaction within the tool	5	114	I thought that maybe that in one direction it does one thing, in the other direction it does the other thing but then I found that it all did the same thing.
Learning over time	Participant references to their ability to learn to use the tool	3	10	I really enjoyed it, so I would love to spend more time to experiment with... I think maybe if I got more used to the controls and... You know, maybe the more you use it, the more you would understand like if I do this it's going to do this.
Kinds of bodies the tool makes	Participant descriptions of the bodies the tool makes	4	17	"we're in the borderlands of gender identity"
Human body	Participant references to the body	4	80	One was being very challenged by the bodies that were in front of me and being like, oh, wow, it just really challenges my perception of how things should move, yeah, with the change and like the bodies were often very wonky and I also observed us also saying, oh, no, it's less human and this and that and I'm like, well, no, actually, I've seen that body as a normal body, also as human, and I thought that was interesting, just how like we've framed and not framed like what human is in terms of whether it's wonky or not.
Expectation of competence	Participant discussion of competence in relation to the tool	2	11	But also, we are all people are used to trying out the whole tool, the options our selves until we come up with the solution. We don't think, ask the question first.
Coming in without an idea	Participant references to coming in without an idea	3	6	But I think I wouldn't really enjoy using it if I had something in mind that I had to create and I wanted to create a specific look and then that would be a bit frustrating, with the way that I use it now.
3D modelling experiences	Participant descriptions of their experiences with 3D modelling	4	14	ZBrush Maya is totally not very friendly for these people to use and I think the potential for this software is that it can be designed for this very total beginner to build their characters

Most used functionality/Child Codes	Description	Sources	References	Example
Zoom	Most used function	2	2	Another thing I used and that was to zoom in and zoom out functions, yeah. I was kind of constantly zooming in and out to different parts.
Undo	Most used function	1	2	And I used undo a lot.

Randomiser (Reset)	Most used function	1	1	The reset, sometimes it'll give you a really unexpected but interesting... sort of really, really interesting shapes that might intrigue you or inspire you somehow.
Camera views	Most used function	2	2	Probably front, back, right and left of the figure views.
Most used tools/Squeeze Loosen	Most used function tool	1	1	squeeze sometimes
Most used tools/Push Pull	Most used function tool	4	10	Push/pull because it made... It was the one in which I felt I could sometimes make things bigger or smaller on the basis of that's what I wanted to do to start with. So, I was trying to come to grips with getting it there, to get the basic shape that I wanted.
Most used tools/Carve Round	Most used function tool	1	2	And there's a tendency to gravitate towards curve/round, but I think might be a symptom of the two models that I made personally.
Most used tools/Add Collect	Most used function tool	1	2	One was the add and collect I think
Most used tools/All in rotation	Most used function tool	1	1	I kind of rotated. I didn't really use one more than the other. So, I just kept rotating it so I can move something that responded to what I was doing and then I just kept rotating and changing the viewpoint and then rotating the tools in and out, just to see what I can change. So, I didn't concentrate on one or the other.
Reasons for using tools/Modified desired area	Reason for using most used function tool	1	1	I just randomly went through them to see what highlighted, according to the bits that I wanted to change.
Reasons for using tools/gets expected results	Reason for using most used function tool	2	3	I used push/pull the most because that was the one that was responding usually as to how I was expecting it to.
Reasons for using tools/gets desired results	Reason for using most used function tool	4	5	It was the one in which I felt I could sometimes make things bigger or smaller on the basis of that's what I wanted to do to start with. So, I was trying to come to grips with getting it there, to get the basic shape that I wanted.
Reasons for using tools/felt natural	Reason for using most used function tool	2	3	I think I used it more close to the natural behaviour of the human they want to make the model into real physical world, just to push and pull things.
Reasons for using tools/clearest	Reason for using most used function tool	1	1	Probably because it's the first time I'd used the tool, so I didn't really... can't tell the difference between the rest of the tools and the best four, so I just sort of tried it and then habituate and see which one does what.

Most difficult/Child Codes	Description	Sources	References	Example
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Tool terminology to function	Relationship between tool name and what it does	2	7	So, the carve tool, I wasn't sure how to use that. Because I think I was trying to sort of... Because it wasn't working with the dragging... I wanted to ...just slice it, almost like a knife, an actual carving.
Space and or camera orientation	Orienting self to 3D space	4	7	Because sometimes you can't see where it's happening, so you think you're pulling it but it's actually pushing something somewhere else, so...
Remembering selected tool	Remembering which tool they have selected	2	3	Right. And also with that, to be able to know... Like often there was like, oh, this tool was working really well but I don't know what tool it is, it's not highlighted.
Not understanding the rules	Not understanding how the tool works, particularly interaction and responsiveness	4	9	If like, if you maybe, if you, yeah maybe if you were at the limit of a... Maybe that's why it didn't, if that's why it didn't move, then if it told you it was at the limit then we should know oh well we can't do that. Or else if that particular tool for that particular part of the body wasn't the right tool to use. like if it wasn't possible to squeeze, I don't know, his forearm or something, I don't know if that's...
Model shape	Difficulty with the shape of the figure	2	4	And another thing is that... So, the starting point for this software is the model that you gave to us and actually the starting point of the model, it was strange or difficult to manipulate the shape to how we want. It's not like a very normal shape.
Granularity of modifiers	Difficulty with making detailed modifications	2	4	What I found problematic about that is that it decided what you can move in those details where conceptually I get it. Like it's okay if you look really close up, you want to manipulate the nose or the ear or the fingertips as the high detail and the low detail as the whole body but it also shows which parts of the body you have access to. So, even if you wanted a high detail but you want it on the hip, it's not considered a high detail area.

Creative or Practical Useful Changes/Child Codes	Description	Sources	References	Example
visual map	Desired function	1	1	And that doesn't necessarily even need to be like reflected in what's happening, but some kind of visual map of that would have been really helpful.
using multiple tools at once	""	1	1	So, I guess that sort of makes things easier, if you could use tools at the same time, I think. For me that's quite a big ability because it allows me to work around edges.
tools on the right hand side	""	1	3	And also, the funny thing, and I know this is one is kind of neither here nor there really. But I'm righthanded and my instinct is to go for tools on the righthand side. I mean I know the fields goes to on the left hand side, but my instinct is always to go toward to reach to the right

				to bring a tool in.
toes	""	1	1	And also, I couldn't extend the toes. I was trying to do that.
symmetry	""	4	5	The tool that I wish it could have, maybe a mirror tool that was... In this case I can... Even if I wanted to have a normal character, I don't think I would be able to do it because I don't think it's possible to make both sides the same just by hand, manually. So, I guess it would be handy if it comes in a symmetrical form and I just did half the work.
skeleton, muscle, fat modelling	""	2	3	And if you could maybe grab a certain area, isolate it, change it, go into different level of the body construction. So, go bone, muscle, fat, so you could go in and change that and work your way out. You know a lot more control with how bodies ... how you change the entire thing rather than straightening one limb and then at all crushes up and then its all very ...
shift and select multiple active areas	""	1	1	Maybe you could do it... So, you could like shift like click on one and then click on another and then manipulate them together.
scripting option	""	1	1	Like you can have like a code... like coding layer of this and that'll also, I can see, help people understand what's going on underneath and if they wanted to change something with code and not with modelling, manipulating.
posing functions	""	3	6	Actually, I tried the function at the pose/animate, this one, and I think it is very interesting for me to use something like this to change the pose, using the default pose in the software.
pan camera	""	4	7	I would have a... Instead of like jumping from like front to side, to have more of a swivel so you can kind of rotate it.
other platforms	""	1	2	And just a sort of idea, that how to make it more easy for the beginner, something like a kid to use the software to create some characters, maybe the software can be using the iPad, something like this. So, just use your finger to move and something like you make the... planning the real world. So, this may be more easy for children. Sometimes this is the right audience to use this software. Or, maybe even more amazing, combining with some emerging technology, something like motion capture, the LEAP Motion and VR technologies and maybe they can totally... a very brand new user experience, to use something like this modelling software in a new environment so that they can use total decant to manipulate and model.
multiple views	""	3	5	Whereas being able to kind of flip back and forth between two close ups. You know, 3D is difficult because you, ideally you do want both options you know what I mean. Like a, one view to say wide and one to be a close up. And you know, toggle in those would be useful.
multidirectional cursor	""	1	1	Another thing was to parameterise the mouse. So, I can only use the right-click but it would be nice if I had... I don't know what you call it, arrows, I guess, so I can... Like if I'm only able to use a mouse, at least I can manipulate multiple arrows in different directions,
mesh-based modelling	""	1	1	selecting the grid would be better
lighting	""	1	1	It was quite flat, and I suppose that's why you had the gridlines. But when you rendered it

				back, it just became this sort of fleshy moulded like thing. And I think light is quite important if you're creating anything 3D.
keyboard shortcuts	""	1	3	So, yeah, I think if there's like, I don't know, a key or a shortcut or something that you can press that you know that whatever you're doing right now is squeezing it somewhere.
extra human characteristics	""	3	5	I think it would be good... Especially if the... your idea with the ear and the tail.
hair	""	2	2	You have the much more freedom of modifying the hair, but actually this software you don't have the hair but if there is one you're modifying the hair, I think it's going to be really fucking popular there because most committed people are how you define the genders and the identities for young people or how it's important the hairs, how long it is, what is the texture and the detail of the hairs. I think the hairs is really important inside popular modelling communities, where there is male or female or like transgender, the hair is really important.
geometric shapes	""	3	6	So, if you know that you want... If we wanted our bulbous legs, we could have put like big spheres. Like we could have just taken the shape and added it and it would, I don't know, become that in skin.
free sculpting	""	2	7	I think it would be good... Especially if the... your idea with the ear and the tail, to have just like a free sculpt tool so you can just add excess matter on top of what's already existing.
finer details	""	3	4	So to make really fine adjustments. So you're clicking and dragging, but maybe if you only wanted to move the piece of the part of the body you're working on, like really finely, maybe having the arrows move incrementally...
extra body parts	""	2	2	Or being able to put another head on, things like that. We talked about that. It would be nice to be able to add body parts.
explicit feedback	""	1	3	So yeah, in a practical sense, some, so you click on the tools and then you drag the person's body, sometimes the body doesn't move when you drag it and just some feedback from the system saying 'Oh you've reached a limit in this direction' or something like that would be useful I think.
Dynamically highlight active areas	""	1	2	And also, I mean if you think about in terms of if you want to break up the body up into separate things, then cursoring [ph] over something, which I then, like sort of putting in a colour, and you know that that's what you select.
cut function	""	1	1	I think part is add, the other part is just saying not too much but destroy, cut. I think that part probably is too complicated.
animation	""	1	1	Or, you go for something which is, yeah, I suppose more about animation which has got movement and force and gravity and that sort of eminence that I think would be very different in terms of, I suppose it would be a very different interface.
active tool stays highlighted	""	3	3	There was another really, minor which I found is not knowing which ... not remembering which tool I was in. And even just kind of having that remaining highlighted I think that would be useful for...

active tool indicated by cursor icon	""	1	1	small icons (knife, hand) when selected, things P03 said they want
More Buff' features	""	1	1	super buff, maybe something to add

Changes in what they're trying to make/Child Codes	Description	Sources	References	Example
Unexpected features	Addition of unexpected features changed idea	2	2	"we didn't want a butt and we had to deal with the butt"
Tailoring to its capabilities	changed ideas based on capabilities of tool	2	6	After first using the software and then going back and then going to think about what I wanted to make again, I sort of had more of an idea of its capabilities, so sort of tried to tailor it for the software to something that I'd actually set out and maybe produce rather than try to.
Suggesting ideas	feeling that the tool suggested ideas	2	2	on the other hand, like when it makes things that you don't expect, it's quite nice and you're like, cool, that's... I'll go with that, that's a different idea that I didn't think of.
Seeing where the tool led	feeling that the tool led	1	1	I mean, I know when I came up with the design, I was thinking of the feeling of when we were trying out the tools. And I did look at it more as just a way of going through each tool and seeing where it led me rather than it actually having anything in my head as a sort of final design.
Playing until it looks good	playing rather than going with a fixed idea	1	1	"I think next time I'll just fiddle with it until I get something that looks neat"
Idea felt incompatible with software	feeling that their idea was not possible in software tool	3	6	if you have something in mind that you're trying to do, I found that quite frustrating, like when I was trying to get the top part... the legs to be slimmer and I tried all the tools and I couldn't figure it out.
Going with the flow	Similar to seeing where the tool led	1	2	Yeah I suppose mine did. Well, when I came into the session from the very start, I didn't really have a set character that I wanted to make really. I was kind of just going with the flow and seeing what arose during the session and I think when we did the collaborative thing at the start, that really kind of informed what we did then in the individual thing. But then even in the individual part, my ideas of what I was doing kind of changed as I was working because of the yeah, yeah, just kind of evolved I

				supposed. Like I think the, when I started the individual thing I had these kind of ideas. I achieved all them I think but I think it became something a bit more interesting than I actually thought it would.
Giving up control	process of creation as giving up control	1	1	I also kind of felt exactly the same, in this way of like, oh, I couldn't control it, and I think I started to quite like that towards the end. I kind of felt like, oh, it's quite nice to like maybe give in to that and be like, okay, well, I can't really control it, so, fine, let's see what this like random logic does to like... when... in like relationship to... Yeah, like you make it together somehow. I liked that, giving up control.
Forcing it	Forcing the tool	2	2	With the first one I tried to... Like as I started to understand what the software could do, I tried to force it to try to do what I wanted it to do.
Challenging perception of bodies	feeling perception of bodies was challenged by the tool	1	2	Yeah, I absolutely changed how I wanted to make things and what I wanted to make and think that was... There's like two parts to that. One was being very challenged by the bodies that were in front of me and being like, oh, wow, it just really challenges my perception of how things should move, yeah, with the change and like the bodies were often very wonky and I also observed us also saying, oh, no, it's less human and this and that and I'm like, well, no, actually, I've seen that body as a normal body, also as human, and I thought that was interesting, just how like we've framed and not framed like what human is in terms of whether it's wonky or not.

Session specific/Child Codes	Description	Sources	References	Example
Similarity with Neighbours/Ease and capabilities of tool	Similar modification resulted from ease of making that modification	1	1	Well, I was just trying to make things like protrude from the head, really, and I thought like the ears is the only thing that I can really stretch, so that's what I went with and I was going to do it with the nose as well but I wanted it more like coming from the head but this was really tricky. So, I just did... That's why I pulled the ears out like that and then... and then I kind of liked the shape that it made as well.
Similarity with neighbours/Carrying skills over from collaborative session	learned how to make something in the collaborative session and took that into the individual session	1	1	Well, when we did the one together, we did something with the ears and we made them a little bit bigger. But then, when I was doing it on my own, I managed to stretch them out even more. And you did as well.
Intentionality of Limb Disappearance/Intentional attempt	Participant intended disappearance	1	3	Mmh-hm.
Intentionality of Limb	Accidental limb disappearance	2	3	But not purposefully, though. I think I stripped a muscle.

Disappearance/Accidental result				
Intentionality of Abstraction/Intentional Abstraction	Abstraction was the intention of the participant	1	1	Yeah, I share with P02's idea but I think from my part I think it's great to retain certain kind of abstraction. I think there is a kind of really kind of new inspirations where like thinking doing the modelling based on a humanoid and I like this kind of interesting relationship of an abstract humanoid and yeah, I think actually this stuff gave me that kind of restriction and freedom and kind of unexpected because it didn't give you a lot of feedback.
Intentionality of Abstraction/Freedom in randomness and unexpected abstraction	Abstraction opened new possibilities	1	1	When you're faced with being able to do literally anything that often is too much and actually stops you creating, to sort of have a yeah, yeah, to have some restrictions and some limitations actually fosters creativity in a lot of ways.
Intentionality of Abstraction/Arose from P01's idea in brainstorming session	One participant's work tends toward abstraction	1	1	I think that came up in the session actually when we were talking about, when we did the drawing listening to the sound and then trying to translate that into the body form. Yeah, I definitely when I came into the session, I thought yeah, I didn't know what I was going to do [laughter]. But yeah, it became a lot more abstract than I thought it would be.
Inquiry and Frustration/Shyness about basic questions	Participants felt shy about asking simple questions	1	3	Its also, just shyness. You know, room of strangers and kind everyone does that [imitating mumbling]. And then perhaps more than that, not necessarily having a clear sense of the question that I wanted to ask. It's like ... kind of like, how do I make it not look bad.
Inquiry and Frustration/Presumption of own skills	Participants feel their skills should prevent them from needing to ask basic questions	1	3	And I wouldn't, if I were doing something, I wouldn't expect to have to ask a question that basic given the skillset I have already.
Inquiry and Frustration/Not sure what question to ask	Participants unsure about what question to ask	1	1	I don't know what question I needed to ask in order to get the result that I wasn't sure what ... I wasn't ... yeah, maybe it was partially not really knowing what I wanted as well, or not knowing what it was ... what the limitations of the program were, so I wasn't sure what I could achieve. So, I wasn't sure of what question to ask cos I wasn't sure what it was I was trying to achieve.
Inquiry and Frustration/Not able to figure it out	Participants not able to figure out the problem on their own	1	2	So, I feel like maybe I was not that frustrated with the tool, cos I'm quite used to like walking into a room and not be sure of what I'm doing but figuring it out over time. And that's how I got to that point, but then it just, especially with the last five minutes which I got to this point where I just couldn't quite push it to the point that I needed to anymore.
Inquiry and Frustration/None of us can do it	None of the participants could do what the desired	1	1	And its only when I was looking at everybody else, I was thinking, oh none of us can do this you know.

Inquiry and Frustration/Figuring it out by playing around with it	Participant attempt to figure out the tool by playing with it	1	2	I think I thought, I could figure out how by playing around with it. That's like, cos that's normally how I learn. I just ... I often, I taught myself to draw, I taught myself. I'm not actually educated in that to be able to draw or in software.
Inquiry and Frustration/Don't pick things up with idea in mind	Participant difficulty with format of workshop	1	2	Echoing, you know, the sort of self starter ethos and I suppose that quite with new tools, you sort of play around with them to see what they can do. And its sort of, its rare that I will pick something up with the ... in the way that we did here with a specific objective in mind.
Inquiry and Frustration/Assuming I'm doing it wrong	Participant assumption of own incompetence	1	2	Well I would have assumed, I mean, to being with I assumed I couldn't do it. I normally would, if I pick up some tech which I don't know, I assume I'm doing it wrong.
Activity in Other Tabs/Looking for desired functionality	Participant looking for functions they wanted	1	2	Actually, I tried the function at the pose/animate, this one, and I think it is very interesting for me to use something like this to change the pose, using the default pose in the software. Yeah, it's good. And I'm not sure the function... something like the skeleton, what is this function for, but I know some of the modelling software, they can change the skeleton, the position of like this, this and you can create a pose totally by yourself and make the animation.
Activity in Other Tabs/Curiosity	Participant curious about other functionality in the tool	1	2	I was wondering whether there were clones. I know. Not now. I found the bit where it's like no genitals. I was just really confused by the whole testicles situation. But how... It was just like genitals were just testicles.

Unexpectedness/Child Codes	Description	Sources	References	Example
Using tools because they gave expected results	Avoiding unexpectedness, pursuing expectedness	2	2	because that was the one that was responding usually as to how I was expecting it to.
Unique results	Enjoying unique or surprising results	3	4	Yeah, actually I agree with the randomness and I think that's the bit that you can always get this originality in... individuality, whenever you're creating a character. It just comes out never the same and you can sort of give a go and let yourself in and then give it up and then you always, yeah, have some surprises. So, it's very good.
Response	Participants experiencing unexpected responses from the tool	2	4	It was like the same distance and the same location, I can only think that it's like it's the centre point inside the object that I'm moving is altering it as I move it. But I just, I didn't have a point of reference as to knowing how it was changing in respect of my cursor. That it was altering the way that develops. So, that was a little difficult, that you can like, so if you could like kind of locate where its going to be in proportion to it would help give some sort of expectation as to what's happening I think.
Modifications by accident	Achieving unexpected results	4	6	I really ... I honestly I couldn't get my head around what that was doing. I was ... I yeah, I tried it a couple of times. It made my model fat at one point, which I was like, wish I'd been making Tony, that would have been perfect. But this guy was supposed to be skinny, and I was like, fuck's sake.
Fun to not have too much fixed in mind	Going with unexpected results and exploring	4	5	I'm just thinking about how I can make thing just whatever is unexpected or I want more control or less control and I think compared to the mainstream, all those different platforms and software, the objective of my intention is just trying to use the better part of that certain software to achieve my objectives. So if there is some unexpected thing happening that's really interesting.
Support for Creativity/Child Codes	Description	Sources	References	Example
Tool as sketchpad	Describing using the tool to sketch ideas	1	1	I think for me for individual part, I really kind of like regard the software as a kind of new canvas and trying to just use this sketch as... Kind of unexpected actions, just kind of to stimulate another kind of new ideas just come from me. So it's that like, yeah, I think it's definitely changing and adapting but sometime I kind of reflect back to particular gestures and way from the conceptual drawings. I go back and forth, so I think software, I think make me think lots because I don't really feel waste, didn't waste time on rotating, making drag, you know because it's too simple so you can't waste time if you don't need to correct and go, you don't need to reset, you don't need to, no, so think and where is the unexpected? [Laughter]. Event,

				yeah.
Suggestions by tool	Experience of the tool suggesting ideas	1	3	Yeah, it's nice because if you don't go in with an idea, then you could really create anything. It could be inspired by the new refresh that's popped up. So, that's quite cool.
Success as motivation to keep trying	Motivated by success	2	2	Well, I feel it was successful and certainly motivated to continue rather than getting like really frustrated. Cos I think its something that's obviously we all, can't realistic do at this moment.
Stability	Stability of the tool in comparison to others as creative advantage	2	2	making crazy shapes and it doesn't fuck up!
Simplicity is important	Simplicity in the tool and its affordances as important	2	3	And I think the way of this software, the uniqueness of this software, is actually if it can retain this kind of simplicity if you can, actually you have to export into the other platform, it has this kind of optimised magic polygon, also you have the skeleton. It can be easily be used to different kind of platform.
Restriction in creativity as positive	Restriction in affordances producing positive creative results	2	2	Yeah yeah, say if I went into Maya or other 3D modelling. Oh my God, it's different wheels, perspective from, sometimes you just miss it and you clip something, you don't know what happens. I'm not like a mature, really experienced user of a particular software because I'm constantly changing to different platforms so yeah, I think simple simplicity is really important, yeah.
Providing all options	Providing all possible options to the user in terms of the body	1	2	But that's the flexibility of it, though, right? So, you can give everybody... You give the model everything for the person to start with and they choose what they want, so they can create the model that they want.
Openness	Openness to various ideas in working with the tool	4	11	This happened just randomly and that's kind of what I wanted to do. So, I was doing that a lot and that managed to make the kind of body shape I wanted and then... Yeah, it was a lot like discovering just randomly what worked.
Objective is to not be precise	Objective of the tool is something other than precision encouraged by other tools	1	1	I think probably most of the 3D modelling software, the objective is trying to make a precise action, with just like... yeah. But yeah, so I think this one is just go another way, the opposite way.
Not able to achieve desired results	Participants did not feel able to achieve desired results	3	12	Yeah, I think I did the complete opposite. And that's I mean about halfway through that its trying to do something which it couldn't do. Like I went more with what I would want to make which would be something which is more animation wise. You know, a rigid [s.l.] body, but with movement and with, I dunno. And then because I think I didn't do what you guys did

				which is what the programme tried to force it do, and I wanted to do, it didn't do it. And then I got frustrated with it because it wasn't doing what I thought it should do rather than working within the constraints. But yes, which would have been the smart thing to do I think.
Limitations of the tool	Perceived limitations of the tool	3	14	I know the tool is capable of this, I know the tool is capable of making a strange lumpy body and things like that. And like, how I can play with that and how can I experiment with that with waves.
Lack of control	Participants perceive lack of control in tool	3	11	Like I had something in mind that I wanted to do and then I couldn't understand, basically, what was the logic behind what I was doing. Like even... So, for the bit here, I couldn't tell really what was the difference in... You know how you explained like one is to pull, one is to lengthen and shorten, this I couldn't really...
Lack of change	Participant perception of lack of change to figure	2	3	no matter what you'll still see the original
Influence by previous ideas and collaboration	Influenced by collaboration in first session of workshop	1	1	influenced by previous idea
Getting past the software	Participant describes getting past software and focusing on figure	1	5	Yeah that's something that like I think is a problem with all digital art making tools is trying to get that balance of getting past the tool, getting past the learning, the tool, because if it's too complicated then your whole process is actually just about learning the tool and you're just learning new techniques really but you're not actually implementing them in an artistic way or you're not integrating them into your...
Feeling absorbed	Feeling absorbed by interacting with the tool	2	6	We were kind of absorbed.
Dejection	Feeling dejected and defeated in interacting with the tool	1	1	"I don't think it's possible to make something good"
Comparison to analogue art	Comparing the tool to analogue art processes	4	9	Anatomically it's a very odd way of modelling. You know even if, if you were to look at it from the sense of just sculpture, so how you form clay, then you would not want to isolate. Then you'd want to go completely the opposite direction. Not have any of the ... you just have a lump of clay that you then push into.
Collaboration with tool	Describing relationship with the tool as a collaboration or something made together	3	10	let's see what this like random logic does to like... when... in like relationship to... Yeah, like you make it together somehow. I liked that, giving up control.
Bodies as metaphors	Bodies as metaphors in art	1	1	... human being as a cypher, as metaphor for ...
Achieving desired results	Participants able to achieve	2	6	Okay, for the lengthening and shortening, this is how I managed to extend

	desired results			the fingers,
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Software tools vs Other Software Tools/Child Codes	Description	Sources	References	Example
Uniqueness of randomizer	Difference to other tools	1	1	The thing I really liked is, I think I said before as well, the reset. It's quite different compared with the other sort of... where you always get standard... The reset, sometimes it'll give you a really unexpected but interesting... sort of really, really interesting shapes that might intrigue you or inspire you somehow.
Unconventional	Difference to other tools	1	1	And in terms of achieving what I originally wanted, it was a tiny bit tricky because it's not... It's really special and it's not quite similar to the conventional 3D models where you have the points and lines that you can manoeuvre and then you achieve the drawing that you designed, which was really good.
Similarly hard to use	Similar comparison to other tools	1	1	And I mean, the sort of positives of posing particularly is it quite kind of friendly interface and its quite responsive and you've kind of got a track ball for moving the camera around and stuff like that. But it is also like, it is also difficult to use. Like you can pull things and the whole body like twists out of shape in the kind of same way. And like there isn't ... I don't think there's been a sort of definitive interface paradigm that's really kind of solved it if that doesn't sound like a really pretentious phrase.
Similar terminology and interaction	Similar comparison to other tools	1	1	And also, push and pull is very common to other programmes like Sketch Up, it makes sense cos it is just push and pulling and moulding. So, it's a sculpture. It makes the most sense to use those two.
Requires skill	Similar comparison to other tools	1	1	And yet the output I think is similar to other software. Because I think the... Like the person also needs to have the skill to be able to create something in it. So, yeah, I didn't quite have it. So, it would be like similar in other things.
Object is not precision	Difference to other tools	1	1	So you don't know, you have to try, zoom in, zoom out, have to try, yeah. I think probably most of the 3D modelling software, the objective is trying to make a precise action, with just like... yeah. But yeah, so I think this one is just go another way, the opposite way. So if with P02's like suggestion if you gave a certain kind of feedback but this kind of relationship of freedom and restriction can be really kind of crazy, being too crazy in practice. It force you to try and be creative because, yeah, yeah, really can give time to think within this software yeah. It's actually, it give you a pencil, it just give you one pencil, like black colour.

More stability	Difference to other tools	2	2	I think it's unique, yeah, yeah, quite special, yeah. I don't have that experience before. A similar one is Sculptris, Sculptris is not stable, it's fucked up every 30 seconds or I have to constantly save it. So this is why today, why this one is really stable.
More engrossment	Difference to other tools	1	2	With most of them, you go to export some certain format or adding something and yeah, I think this one, it's too simple, so I can get into it easily, yeah. You feel you have really familiarised, yeah. So yeah, I think that was... You forget it, yeah, important, yeah. You're inside and processing, making, not inside or process of learning, we're learning, debugging, checking, yeah.
More ease for casual users	Difference to other tools	1	1	It's like a nice in between going in on the main and picking select options that make it very limited to only what the designers think should be a thing. But not to the level of Maya but be in the middle of like... for people that really, really liked games. I mean, like I remember Call of Duty, you were allowed an emblem, like a little logo that went next to your name on like the end bit, and people would get so creative because like you could get all different colours and all different shapes and people would make amazing emblems, you know, people who really want to do it more than just, okay, I'll play this game and character play the game, cool. People might go into this and be like, oh, I can make my character really different or really like me or... and allow you to change things like actual real ideal body types, I guess, because, yeah, avatars are obviously not very realistic.
More ease for beginners	Difference to other tools	1	5	But for some entry levels, just like me, I have the experience of some modelling software but for total beginners, that they want to make some characters like this, how can they get into the software very quickly, that's the problem, and ZBrush Maya is totally not very friendly for these people to use and I think the potential for this software is that it can be designed for this very total beginner to build their characters. It can be not very professional advanced for them but just very simple and simple functions for them and they can get into very quickly. Yeah.
Less proficient at angular shapes	Difference to other tools	1	1	But some bits, some tiny details that... Like if I were able to make a triangle or my character was kind of able to have this sharpness, a bit tricky to achieve that.
Less ease of camera movement	Difference to other tools	2	3	Yeah, I was more thinking about the... Yeah, there was the navigation as well. Like just in terms of the other software, there's a... Their navigation system is similar and have this kind of... you know, a changing box or you have kind of shortcuts where you can just navigate more seamlessly. So, you

				can sculpt it easily, I guess, instead of a front view and side view. There's a quarter view I actually want to look at and some bits I agree. The thing with the chin. We were sculpting together and there was a chin bit here, it was like a fish, and we want to get rid of it. The front view and then the side view, it was quite... a little bit hard to get rid of that bit.
Less control	Difference to other tools	1	2	Whereas it was in ours, its just an arrow you're dragging around. It's just there's no point as yeah, you just can't. You don't have any control over what you're doing. You don't know what you're affecting.
Less complexity	Difference to other tools	3	6	Yeah yeah, say if I went into Maya or other 3D modelling. Oh my God, it's different wheels, perspective from, sometimes you just miss it and you clip something, you don't know what happens. I'm not like a mature, really experienced user of a particular software because I'm constantly changing to different platforms so yeah, I think simple simplicity is really important, yeah.
Fewer controls	Difference to other tools	2	2	"it's pretty intuitive to approach and there's not too many controls"
Difficulty of 3D on 2D screen	Similar comparison to other tools	2	2	So, my only experience of creating modelling is in VR...and that obviously the operating system is very much similar to... Compared to this it's much more similar to actually physically doing it because you do it with your arm movements and you can work in a 3D way. So... But as soon as you do it on the computer, you're forced to work in 2D onto something that's 3D, so it's not very intuitive and it never will be, unless you have some sort of tool to enable 3D movements.
Design continuity with other tools	Similar comparison to other tools	1	2	Yeah, its to the right. Photoshop and Indesign.

Similarities and Differences with Other Tools/Child Codes	Description	Sources	References	Example
Similarities/Weightless uncanny valley	Descriptive code of participant response	1	1	Yeah. I mean that they often feel sort of weightless and not, sort of just in that sort of creepy uncanny valley of not real but sort of ... exaggerated enough to be sort of interesting and fun. Yeah, its kind of, its sort of it's a really weird middle ground between realism and caricature.
Similarities/Requires skill	""	1	4	And yet the output I think is similar to other software. Because I think the... Like the person also needs to have the skill to be able to create something in it. So, yeah, I didn't quite have it. So, it would be like similar in other things.

Similarities/Flattening of 3D on 2D Screen	""	2	3	But as soon as you do it on the computer, you're forced to work in 2D onto something that's 3D, so it's not very intuitive and it never will be, unless you have some sort of tool to enable 3D movements.
Similarities/Feels intimidating	""	1	1	Like if it's a completely fantastical creature that doesn't need to look... like have any resemblance to anything, then I think perhaps I would find it easier. But when it's human things, I do find it difficult.
Similarities/Difficult to use	""	1	1	But it is also like, it is also difficult to use. Like you can pull things and the whole body like twists out of shape in the kind of same way. And like there isn't ... I don't think there's been a sort of definitive interface paradigm that's really kind of solved it if that doesn't sound like a really pretentious phrase.
Differences/Human 3D Modelling/More Stability	""	2	5	I think it's unique, yeah, yeah, quite special, yeah. I don't have that experience before. A similar one is Sculpttris, Sculpttris is not stable, it's fucked up every 30 seconds or I have to constantly save it. So this is why today, why this one is really stable.
Differences/Human 3D Modelling/Feeling more represented (body)	""	1	1	I felt quite represented in that, with this kind of slightly liminal space of like, oh, okay, that shoulder's doing that now and I thought, yeah, it felt really... Like I recognised myself a lot more in it than I have in game/avatar-making.
Differences/Human 3D Modelling/More enjoying randomness	""	1	2	Yeah, actually I agree with the randomness and I think that's the bit that you can always get this originality in... individuality, whenever you're creating a character. It just comes out never the same and you can sort of give a go and let yourself in and then give it up and then you always, yeah, have some surprises.
Differences/Human 3D Modelling/More engrossment	""	1	3	With most of them, you go to export some certain format or adding something and yeah, I think this one, it's too simple, so I can get into it easily, yeah. You feel you have really familiarised, yeah. So yeah, I think that was... You forget it, yeah, important, yeah. You're inside and processing, making, not inside or process of learning, we're learning, debugging, checking, yeah.
Differences/Human 3D Modelling/More detail and expressiveness	""	1	1	So yeah, my primary experience with like avatar creation tools is actually more limited to games and you know, when you're setting up the character in the game, a lot of the time you just have these kind of I decide what hair to give them, you decide what clothes, it's really limited. These limited kind of choices. You can't affect the shape of the character at all. So in terms, like compared to that, something like this, this way of creating an avatar is a lot more expressive and there's a lot more you can do, you know.
Differences/Human 3D Modelling/Less precision	""	1	2	I think probably most of the 3D modelling software, the objective is trying to make a precise action, with just like... yeah. But yeah, so I think this one is just

				go another way, the opposite way.
Differences/Human 3D Modelling/Less ease of navigation	""	1	1	And I mean, the sort of positives of posing particularly is it quite kind of friendly interface and its quite responsive and you've kind of got a track ball for moving the camera around and stuff like that.
Differences/General 3D modelling/More comparative ease of use	""	1	4	ZBrush Maya is totally not very friendly for these people to use and I think the potential for this software is that it can be designed for this very total beginner to build their characters. It can be not very professional advanced for them but just very simple and simple functions for them and they can get into very quickly. Yeah.
Differences/General 3D modelling/Less subtle response	""	1	1	The graphic moved with your movement. That could be maybe easier, also to get a feeling of whether it's squeezing or stretching or doing whatever it's doing. Because that is the easiest, the joy of randomness, that you're not like, ah...
Differences/General 3D modelling/Fewer straight lines	""	1	3	So, its straight lines. And well you do have organic form as well, but you tend to not, it tends to be sort of more mathematical and geometric. And I think organic forms might be sort of trickier to do that with. So, hence, why maybe it's a bit messier when it comes to the tools that you use. But yeah, I suppose it depends on what you wanted to get out of what you wanted people to use it for.
Differences/General 3D modelling/Less spatiality than when working in VR	""	2	3	So, my only experience of creating modelling is in VR...and that obviously the operating system is very much similar to... Compared to this it's much more similar to actually physically doing it because you do it with your arm movements and you can work in a 3D way.
Differences/General 3D modelling/No scripting layer	""	1	1	Like you can have like a code... like coding layer of this and that'll also, I can see, help people understand what's going on underneath and if they wanted to change something with code and not with modelling, manipulating.
Differences/General 3D modelling/Less ease of navigation	""	1	3	Yeah, there was the navigation as well. Like just in terms of the other software, there's a... Their navigation system is similar and have this kind of... you know, a changing box or you have kind of shortcuts where you can just navigate more seamlessly. So, you can sculpt it easily, I guess, instead of a front view and side view. There's a quarter view I actually want to look at and some bits I agree.
Differences/General 3D modelling/Ability to use multiple tools and move easily IRL	""	1	1	But I guess, yeah, the ability to like easily move around, so like whether that's... I discovered the like 4862 keys, being able to like turn it up, down, like that. So, I guess that sort of makes things easier, if you could use tools at the same time, I think. For me that's quite a big ability because it allows me to work

				around edges.
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Responsiveness/Child Codes	Description	Sources	References	Example
Preference for more reactive tools	Participant response related to responsiveness of tool	3	6	So, it wasn't you had to click and hope but more that it actually... The graphic moved with your movement.
More response increases joy in randomness	Participant response related to responsiveness of tool	1	1	And also a little more subtle response. So, it wasn't you had to click and hope but more that it actually... The graphic moved with your movement. That could be maybe easier, also to get a feeling of whether it's squeezing or stretching or doing whatever it's doing. Because that is the easiest, the joy of randomness, that you're not like, ah...
More information about response or lack thereof	Participant response related to responsiveness of tool	1	1	So yeah, in a practical sense, some, so you click on the tools and then you drag the person's body, sometimes the body doesn't move when you drag it and just some feedback from the system saying 'Oh you've reached a limit in this direction' or something like that would be useful I think.
Lack of response as problematic	Participant response related to responsiveness of tool	4	13	... because its ... because actually all those tools are perfectly reasonable to use and would give you a good result if they were more responsive.
Fatigue with lack of response	Participant response related to responsiveness of tool	1	1	"let's restart and see if we can just end up with a rounded head"

Randomness/Child Codes	Description	Sources	References	Example
Working with randomness	Relationship to randomness of the tool	1	3	I think all of them were actually highlighted in the same... like the whole body and I tried like doing... clicking around the head and pulling down and this was kind of elongating the whole body and this is just great. This happened just randomly and that's kind of what I wanted to do.
Frustration with randomness	Relationship to randomness of the tool	1	2	It seemed to be completely random and that caused a lot of frustration I think, because it meant that I couldn't map out or even

				be creative. It was just kind there was it was almost just wanted me ... made me want to give up because I just ... it felt like it ... there was no way I could achieve anything from it.
Enjoying the randomness	Relationship to randomness of the tool	1	5	I also kind of felt exactly the same, in this way of like, oh, I couldn't control it, and I think I started to quite like that towards the end. I kind of felt like, oh, it's quite nice to like maybe give in to that and be like, okay, well, I can't really control it, so, fine, let's see what this like random logic does to like... when... in like relationship to... Yeah, like you make it together somehow. I liked that, giving up control.

Perception of Interaction/Child Codes	Description	Sources	References	Example
Unsure how effect was achieved	Participant description of aspect of interaction	2	6	Yeah, I had no idea how you did that.
Unique effects	Participant description of aspect of interaction	2	4	And in terms of achieving what I originally wanted, it was a tiny bit tricky because it's not... It's really special and it's not quite similar to the conventional 3D models where you have the points and lines that you can manoeuvre and then you achieve the drawing that you designed, which was really good.
Unintuitive	Participant description of aspect of interaction	1	1	And also, the funny thing, and I know this is one is kind of neither here nor there really. But I'm righthanded and my instinct is to go for tools on the righthand side. I mean I know the fields goes to on the left hand side, but my instinct is always to go toward to reach to the right to bring a tool in.
Unclear concepts	Participant description of aspect of interaction	3	15	Yeah. I was trying to do some shift... Because at one point I thought, oh, maybe if you do the opposite, then it will go in the direction. Because once it worked like that.
Trying to find parameters that go with intentions	Participant description of aspect of interaction	4	4	And there's a tendency to gravitate towards curve/round, but I think might be a symptom of the two models that I made personally. And I think as much like my hands response was push and pull, I kind of knew where I was going with it. And I felt the most confident using that one. If you're on push and pull sometimes I would do something, and I would get something crazy. Like I don't know, I'm going back to curve-round.
Sure how effect was achieved	Participant description of aspect of interaction	2	4	Well, I was just trying to make things like protrude from the head, really, and I thought like the ears is the only thing that I can really stretch, so that's what I went with and I was going to do it with the nose as well but I wanted it more

				like coming from the head but this was really tricky. So, I just did... That's why I pulled the ears out like that and then... and then I kind of liked the shape that it made as well.
Some effects more understandable than others	Participant description of aspect of interaction	2	2	And there's a tendency to gravitate towards curve/round, but I think might be a symptom of the two models that I made personally. And I think as much like my hands response was push and pull, I kind of knew where I was going with it. And I felt the most confident using that one. If you're on push and pull sometimes I would do something, and I would get something crazy. Like I don't know, I'm going back to curve-round.
Not fine enough detail	Participant description of aspect of interaction	4	10	So, sometimes, like you were saying earlier, when you made an adjustment, it would affect both sides of it but sometimes you don't want that and sometimes you just want to have like a local control so you can control just what's on the...
Not being able to do it	Participant description of aspect of interaction	4	27	And then because I think I didn't do what you guys did which is what the programme tried to force it do, and I wanted to do, it didn't do it. And then I got frustrated with it because it wasn't doing what I thought it should do rather than working within the constraints. But yes, which would have been the smart thing to do I think.
Intuitive	Participant description of aspect of interaction	1	1	I think now, yeah, I think the powerful part is the modelling, it's intuitive
Inconsistency of interaction	Participant description of aspect of interaction	4	22	Like I put the entire body over there. So, sometimes it does, sometimes it doesn't.
Helper graphics not clear	Participant description of aspect of interaction	1	2	participants just figured out that red areas are active
Fun with randomizer	Participant description of aspect of interaction	1	1	played with the randomizer a bit
Effects not subtle	Participant description of aspect of interaction	2	4	And also a little more subtle response. So, it wasn't you had to click and hope but more that it actually... The graphic moved with your movement.
Effects appear too similar	Participant description of aspect of interaction	4	5	Then sometimes when I use one function, what I found is very strange.... These two functions had a similar or same effect when I used... when I clicked this button. Sometimes when I used the first function or the second function, I found they can do similar things and this will be confused what specific effect this function can create. This is a little confusing for me sometimes, when I used it.
Difficulty with view	Participant description of aspect of interaction	4	6	One of the things that I found a bit frustrating about the interface was the fact that the camera reset on whenever you changed the angle. There were points at

				which, say for example, you'd be zooming in on a head and you sort of wanna check the side view and see how the move you just made affect things. And it just resets back to the full body.
Confusing terminology	Participant description of aspect of interaction	3	7	For the words that you're using as well, and like the description of tools, if it was... Like, for example, squeeze and loosen, like vocabulary-wise I wouldn't know, if I had a sculpture, what I would do to squeeze it or loosen it.
Back and forth between user and software	Participant description of aspect of interaction	3	5	I really enjoyed it, so I would love to spend more time to experiment with... I think maybe if I got more used to the controls and... You know, maybe the more you use it, the more you would understand like if I do this it's going to do this. I don't know if that's a limitation in the software or if it's like coming from me not being used to using it as well. And then, yeah, I'm sure...
Perception of consistency in relation to interaction/Inconsistency of view	Participant response related to consistency of interaction	1	1	And another thing I just remembered as well, when you're in... using your arrow keys to navigate around, the zoom changes. So, just to bring that up.
Perception of consistency in relation to interaction/Inconsistency of interaction	Participant response related to consistency of interaction	4	12	And, well, the only thing is like the different areas that it highlighted. So, I tried to... And I didn't understand what I was supposed to do with the mouse, how to control it best and, like you said, like you do one thing and it makes it bigger and then you do the same thing and it makes it smaller.
Perception of consistency in relation to interaction/Inconsistency of effects	Participant response related to consistency of interaction	3	5	So, sometimes, like you were saying earlier, when you made an adjustment, it would affect both sides of it but sometimes you don't want that and sometimes you just want to have like a local control so you can control just what's on the...
Perception of consistency in relation to interaction/Inconsistency of affected area	Participant response related to consistency of interaction	1	3	I think it's good because you get really close up and you can see but considering that there's no like minute detail contour changing, it seems really difficult to adjust. Because I found sometimes when I adjusted something in the... that was red, that it affected the white part.
Perception of consistency in relation to interaction/Important simplicity	Participant response related to consistency of interaction	1	1	I think for me this figure view is the most important. I sometimes used top and bottom to check where is the high details and I think it's quite, they are quite, even though you're separate when you're adding the zoom in and zoom out, yeah. Constantly checking from different parts, yeah. I think it's really simple and useful, yeah.
Feedback/Wanting to be told the limits of the system	Participant response related to feedback of system	1	3	So yeah, in a practical sense, some, so you click on the tools and then you drag the person's body, sometimes the body doesn't move when you drag it and just some feedback from the system saying 'Oh you've reached a limit in this direction' or something like that would be useful I think.

Feedback/Selected areas	Participant response related to feedback of system	1	1	Because otherwise there's no way of knowing what you selected is what you selected. Or if you selected it all. Cos there's just there's no ... there's... it doesn't tell you
Feedback/Interactive responsiveness	Participant response related to feedback of system	2	2	The thing that they've got ... so both those approaches are reliant on sort of visual feedback you know and that was really the difficulty that I had with it, is that the visual feedback wasn't immediate. And like, I'm sort of aware of the fact like it must be quite a complex computational thing to accomplish.

Learning over time/Child Codes	Description	Sources	References	Example
Satisfaction over time	Participant describes feeling more satisfied with results over time	1	2	head issues, but happier this time around
Noticing differences	Noticing capabilities or differences in the tool	2	2	Like not being able to sort of expand the torso in the way that I wanted to and that the first creature kind of meant that I didn't think of doing that in the second. And it became more about learning the kind of, the ways in which things could easily be exaggerated. So, like length of limb and stuff like was a lot easier to do than to bulking up body parts.
Not trying to learn with a specific objective in mind	Participant describes normal process of not picking up a tool with an objective in mind, rather playing around	1	1	And its sort of, its rare that I will pick something up with the ... in the way that we did here with a specific objective in mind. Its more like, oh, look press that and suddenly the head slide is just big. Like that's quite interesting.
Lack of response impeded learning	Not able to learn because the tool is not responsive	1	2	... then I can't figure it out because I don't ... like there's no logic and there's no method to the madness that's going on in front of me. And so I can't figure out what the tools are doing, which I think leads to frustration very quickly because you're, you can't see the issue.
Building on skills from collaborative section	Building on skills learned together in collaborative session	1	1	Well, when we did the one together, we did something with the ears and we made them a little bit bigger. But then, when I was doing it on my own, I managed to stretch them out even more. And you did as well.
Assumption of learning more over time	Assumption that they will be able to learn to use the tool more effectively	2	2	I really enjoyed it, so I would love to spend more time to experiment with... I think maybe if I got more used to the controls and... You know, maybe the more you use it, the more you would understand like if I do this it's going to do this. I don't know if that's a limitation in the software or if it's like coming from me not being used to using it as well. And then, yeah, I'm sure...

Kinds of bodies the tool makes/Child Codes	Description	Sources	References	Example
Borderlands of gender identity	Description of the body	1	2	"we're in the borderlands of gender identity"
Deformity, disability, and pain	Description of the body	1	2	"what is this deformed freak"
Expressive	Description of the body	1	1	So yeah, my primary experience with like avatar creation tools is actually more limited to games and you know, when you're setting up the character in the game, a lot of the time you just have these kind of I decide what hair to give them, you decide what clothes, it's really limited. These limited kind of choices. You can't affect the shape of the character at all. So in terms, like compared to that, something like this, this way of creating an avatar is a lot more expressive and there's a lot more you can do, you know.
Extra body parts	Possibilities	2	3	Or being able to put another head on, things like that. We talked about that. It would be nice to be able to add body parts.
Fictional	Description of the body	1	2	"Klingon"
I could recognize myself	Description of the body	1	1	And I think what was quite interesting about this system was that it felt like I recognised myself a lot more in it. Like I thought like I recognised like different kind of iterations of myself and people I know and like there was a lot more kind of like, okay, that could be me like...
Non-matching	Description of the body	1	1	"what happened to the nice boob, it was matching"
Prehistoric	Description of the body	1	1	it looks like "an earlier version of human life"
Randomly and uncontrollably trans	Description of the body	1	1	And I've never really felt that kind of... And also in its randomness. Because I feel like that's a big part of being trans. It's like, well, it's very random, actually. Like how the body changes with hormones and like it is all just a little bit like, oh, I guess that's happening now and I thought that was quite... I felt quite represented in that, with this kind of slightly liminal space of like, oh, okay, that shoulder's doing that now and I thought, yeah, it felt really... Like I recognised myself a lot more in it than I have in game/avatar-making.
Unique	Description of the body	1	1	Yeah, actually I agree with the randomness and I think that's the bit that you can always get this originality in... individuality, whenever you're creating a character. It just comes out never the same and you can sort of give a go and let yourself in and then give it up and then you always, yeah, have some surprises. So, it's very good.
Without normative specifics	Description of the body	1	1	Yes. Because its also got no ... its like, even the sort of culture references within the body, its like, you know people don't, as you say, people don't stand like that. And I've never seen anybody who looks remotely like that. And you're almost better going with sort of more sort specifics, more ethnic

				specifics then.
Wonky, challenges perception of normality	Description of the body	1	1	One was being very challenged by the bodies that were in front of me and being like, oh, wow, it just really challenges my perception of how things should move, yeah, with the change and like the bodies were often very wonky and I also observed us also saying, oh, no, it's less human and this and that and I'm like, well, no, actually, I've seen that body as a normal body, also as human, and I thought that was interesting, just how like we've framed and not framed like what human is in terms of whether it's wonky or not.

Human Body/Child Codes	Description	Sources	References	Example
Avatars are obviously not very realistic	en vivo	2	2	avatars are obviously not very realistic
Being othered	Perception of bodies discussed during workshops	1	1	"proof of normativity is that you (trans people) [the other] exist"
Different to idea	""	1	2	"we didn't want a butt and we had to deal with the butt"
Feeling represented and seeing self	""	1	1	And I've never really felt that kind of... And also in its randomness. Because I feel like that's a big part of being trans. It's like, well, it's very random, actually. Like how the body changes with hormones and like it is all just a little bit like, oh, I guess that's happening now and I thought that was quite... I felt quite represented in that, with this kind of slightly liminal space of like, oh, okay, that shoulder's doing that now and I thought, yeah, it felt really... Like I recognised myself a lot more in it than I have in game/avatar-making.
Flexibility	""	4	7	But that's the flexibility of it, though, right? So, you can give everybody... You give the model everything for the person to start with and they choose what they want, so they can create the model that they want.
Human body stretched to limits	""	1	2	"the more I worked on it, the more it started to turn into an abstract object which I was sculpting which was kind of nice, but it still retains the human form, just stretched to extreme limits, which I thought was really interesting to see."
Language	""	5	37	not good and fundamentally flawed
Normality or realism of shapes	""	3	5	And another thing is that... So, the starting point for this software is the model that you gave to us and actually the starting point of the model, it was strange or difficult to manipulate the shape to how we want. It's not like a very normal shape.

Normativity	""	5	40	I was wondering whether there were clones. I know. Not now. I found the bit where it's like no genitals. I was just really confused by the whole testicles situation. But how... It was just like genitals were just testicles.
People seem to really stay away from the genitals	Participant interaction with tool in relation to the body	1	1	people seem to really stay away from the genitals
Posing is more realistic	Perception of bodies discussed during workshops	4	8	Actually, if I want to make a human for my product, to show my product, how humans use this product, I think the default position will be very good for me to use, so I can just create a normal pose, like grab, sit, stand, something like this and put my product with the human. And also the expression, it's very good that I... Yeah, I like these functions, expression, pose. It's a lot like I'm in a video game and I can change the expression of my character.
Sexuality as illicit	Perception of bodies discussed during workshops	1	2	You know, I think if you wanted to include something you could have a patch that you could grow or shrink and do stuff with. But as it was, it was like, it seemed provocative for no good reason.
Trying to make limbs disappear	Participant interaction with tool in relation to the body	2	2	they made the arm disappear

Expectation of Competence/Child Codes	Description	Sources	References	Example
Assuming that you're the problem	Perception of own incompetence	1	2	If you know what I mean, you can't see the problems to solve it. So, it's about assuming that you're the problem. Oh okay, that's my problem more than ...
Becoming more competent over time	Perception of own competence	1	1	I really enjoyed it, so I would love to spend more time to experiment with... I think maybe if I got more used to the controls and... You know, maybe the more you use it, the more you would understand like if I do this it's going to do this. I don't know if that's a limitation in the software or if it's like coming from me not being used to using it as well. And then, yeah, I'm sure...
Good at figuring things out	Perception of own competence	1	2	Yeah, and I actually feel like, no, in secondary school anything like that, and I pretty graduated and like managed to like, con my university into letting me show up and work every day. So, I'm quite used to like not having as good of a grasp on anything else, as anyone else does. I walk into like the clay city and like this all means nothing to me. But I'm quite good at like, just sitting and figuring it out. And I don't mind clicking through, going in a lot of detail ...
I assumed I couldn't do it	en vivo	1	1	I assumed I couldn't do it
Inexperienced as caveat to	Perception of own incompetence	1	2	So, I don't know if this is because I never used any kind of software like this

statement				before. Like there is a thing that you have to understand about... use it beforehand but as a first time user I found it quite difficult to control.
Not having skills	Perception of own incompetence	1	1	And like where to take things and where they would carve bits and make it look authentic. I was just thinking like, oh, I need to chop a bit here and kind of seeing what happened. And yet the output I think is similar to other software. Because I think the... Like the person also needs to have the skill to be able to create something in it. So, yeah, I didn't quite have it. So, it would be like similar in other things.
One skillset should translate to another	Perception of own competence	1	2	And I wouldn't, if I were doing something, I wouldn't expect to have to ask a question that basic given the skillset I have already.
Stubbornness	Perception of own competence	1	1	Yeah, good point. Stubbornness.

Coming in without an idea/Child Codes	Description	Sources	References	Example
Frustrating with idea in mind	Descriptive code	2	3	But I think I wouldn't really enjoy using it if I had something in mind that I had to create and I wanted to create a specific look and then that would be a bit frustrating, with the way that I use it now.
Going with the flow	Descriptive code	1	1	Yeah I suppose mine did. Well, when I came into the session from the very start, I didn't really have a set character that I wanted to make really. I was kind of just going with the flow and seeing what arose during the session and I think when we did the collaborative thing at the start, that really kind of informed what we did then in the individual thing. But then even in the individual part, my ideas of what I was doing kind of changed as I was working because of the yeah, yeah, just kind of evolved I supposed. Like I think the, when I started the individual thing I had these kind of ideas. I achieved all them I think but I think it became something a bit more interesting than I actually thought it would.
Seeing where the tool led	Descriptive code	2	2	I mean, I know when I came up with the design, I was thinking of the feeling of when we were trying out the tools. And I did look at it more as just a way of going through each tool and seeing where it led me rather than it actually having anything in my head as a sort of final design.
Sketching quickly	Descriptive code	1	1	I think for me for individual part, I really kind of like regard the software as a kind of new canvas and trying to just use this sketch as... Kind of unexpected actions, just kind of to stimulate another kind of new ideas just come from me. So it's that like, yeah, I think it's definitely changing and adapting but sometime I kind of reflect back to particular gestures and way from the conceptual drawings. I go back and forth, so I think software, I think make me think lots

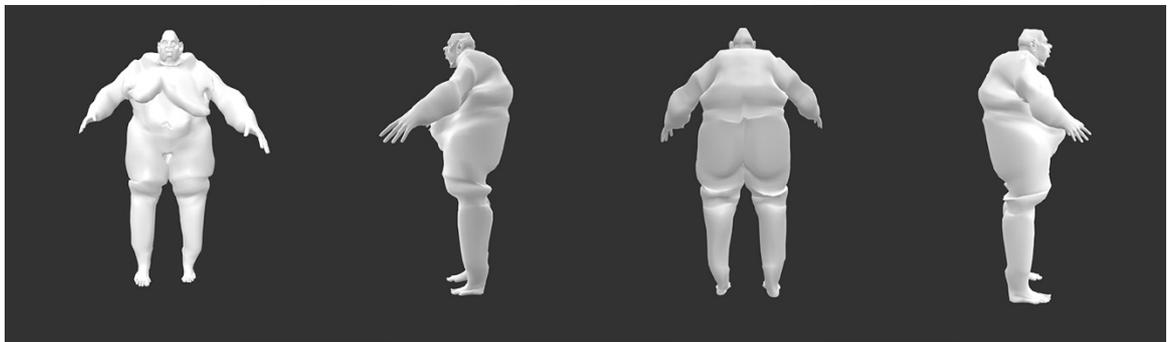
				because I don't really feel waste, didn't waste time on rotating, making drag, you know because it's too simple so you can't waste time if you don't need to correct and go, you don't need to reset, you don't need to, no, so think and where is the unexpected? [Laughter].
Unexpected possibilities	Descriptive code	3	4	on the other hand, like when it makes things that you don't expect, it's quite nice and you're like, cool, that's... I'll go with that, that's a different idea that I didn't think of.

Experiences with 3D Modelling/Child Codes	Description	Sources	References	Example
Complexity	3D modelling as complex	3	3	I follow this one person and her ZBrush stuff is just amazing and it's like how could you ever like... I wouldn't even have the patience to sit down and do that but it's nice. Even though this is... Like you were saying, this would be entry level, it would be nice to be able to manipulate even surface stuff to get some kind of... Even just to understand the concept, so you can move to another tool.
Difficulty of 3D on 2D screen	Disconnect between mouse and 3D object	1	2	I also find some of the other ones hard to use and I think it's... Like for me personally it's the detachment between the computer and like mouse/keyboard and seeing the screen and the figure.
Easier in VR	Easier in VR because it's equally 3D	2	2	But I do find the detachment between the mouse and the keyboard and the screen a bit... It's not like a pen and paper. Like even in like the virtual reality things we do now because that's the same as just like drawing in 3D.
Feels weightless	Objects feel weightless in digital 3D	1	1	Yeah. I mean that they often feel sort of weightless and not, sort of just in that sort of creepy uncanny valley of not real but sort of ...
Importance of lighting	Importance of lighting to modelling in 3D	1	1	I suppose like one of the things that I've noticed in other programmes, I think what is really important when you're working, well even trying to put the indication of something, is really is light, and how you change the light source and then how light falls, it affects how you see a 3D object. And so having that in any 3D program is really important when it comes to rendering or when it comes to making it look pretty and working with it anyway. And I suppose not having that meant that actually visually it flattened it. It was quite flat, and I suppose that's why you had the gridlines. But when you rendered it back, it just became this sort of fleshy moulded like thing. And I think light is quite important if you're creating anything 3D.
Not novice-friendly	3D modelling is not novice	2	3	ZBrush Maya is totally not very friendly for these people to use and I think the

	friendly			potential for this software is that it can be designed for this very total beginner to build their characters
Organic forms are harder to model	Organic forms are harder to model in digital 3D	1	3	I've used things like VectorWorks but that's all for building construction too. Its not real organic forms. I think that would be different, I think.
Pressure of precision	Pressure of precision when modelling complex objects like humans in 3D	1	1	Like if it's a completely fantastical creature that doesn't need to look... like have any resemblance to anything, then I think perhaps I would find it easier. But when it's human things, I do find it difficult.
Requires skill	Requires skill (also compared to physical sculpture)	1	2	I think also because they're quite sculpting-based which is something that is not my sort of area of skill. I find it harder to do sculpting and... Especially human sculpting, I find it quite difficult.

APPENDIX H ART PRACTICE DIARY

06 February 2020

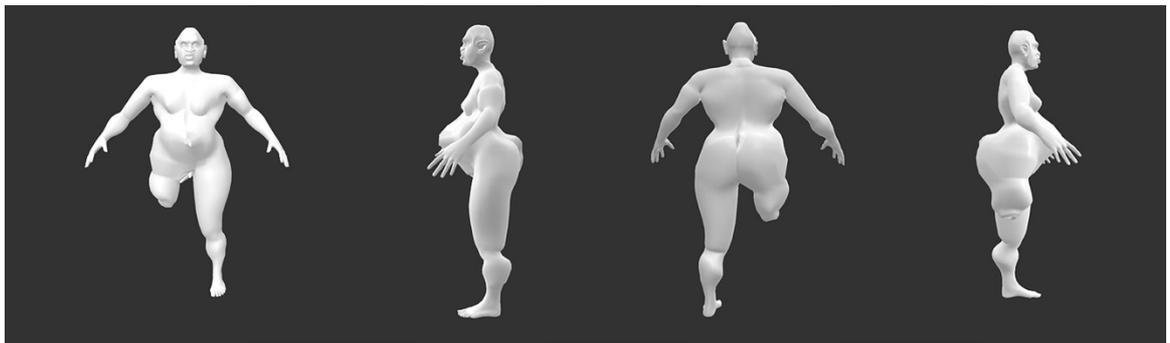


Front, Left, Back, and Right views of model(s) created

Today was my first day using my software purely for my own artistic purposes. It was really exciting, and a relief to be engaging purely as an artist on some level. I feel like in the past, as I've been prototyping this, any enjoyment of a particular interactive activity was always interrupted by trying to optimize it: "Okay, that's nice but could it be better? Is this working, is it working in the right direction? Is it buggy?" It still definitely has a lot of problems. Many of the drag functions don't actually work in the directions that they're supposed to, some don't seem to respond well to really light modifications, and the 'back' function selectively doesn't work. This annoyed me as an artist! I have a lot more empathy for my participants on some level. Still: in terms of sketching a human figure, this was a big moment for me. It's the first time that I've felt like I was truly sketching, rather than modifying someone else's 'barbie'. It didn't feel too perfect, or too precious. I wasn't worried about trying to give it attractive features, modelling it after someone I might find hot in an idealized form, or trying to make a unified whole; rather, I focused on characteristics I found interesting. The rolls on the upper legs I found very appealing and sensuous, and I accentuated those. There was a moment where I chose between making the whole body more flowy and abstract and keeping it in more of a cohesive form but preserving these smaller details, and in this instance I chose to do that, but I'm looking forward to playing with these forms more. It also felt immediately that I was able to play with the body as expression and metaphor

much more. I also felt, though, that the system allowed certain characteristics to come through much more than MakeHuman ever did (fatness, squashed faces, weird nose shapes, rolls here) and I appreciated the lack of symmetry that I built in to the system. I think that the lack of symmetry was an aspect, actually, that made the figure feel more 'real'. My body isn't symmetrical visually, and I think that's true for most people; I think this was a big contribution toward the experience feeling less like modifying a 3D doll and more like a beginning prototype for a complex object.

17 February 2020

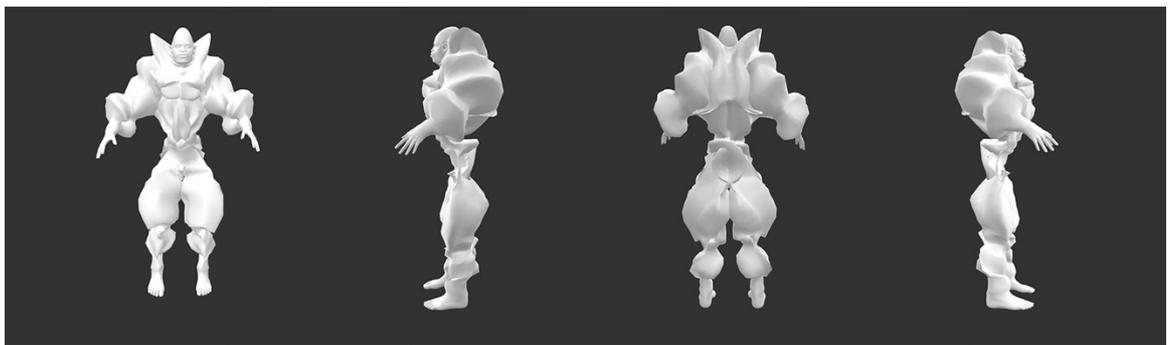


Front, Left, Back, and Right views of model(s) created

In this instance, I was pretty happy with the characteristics that the randomizer generated off the bat. The figure had really wide hips, and I liked that, so I accentuated that aspect a little more and also rounded out the butt. I think I then went to make the leg shorter, and it fully retracted, which I wasn't going for, but once I saw it I was excited and went about making that change look a little more intentional (primarily about not having the little foot hanging off the end of the leg, so shortening the lower leg as well rather than doing it all from the upper leg). I then went about making it less of a conehead shape; I think the system tends toward that because it's an available modifier, but it isn't something I want to repeat over and over. There's a weird error happening on the groin region; my best guess is that is because the leg is shortened and the groin is retracted, but I'm not really sure. The penis I tried to make small enough to be a clit, and it looked that way until I changed the material to export it, which is obnoxious. Changing it will just be a matter of moving that part of the mesh backward in Blender/Cinema 4D though, whereas before I would have had to resize everything individually in the genital region. Actually, I just checked the mesh issue with the groin and it seems like it only happens when the human + genital geometry is applied; that's kind of a problem and something that needs to be solved in the future. The way I have things working at the moment means that that's essential - the figure won't export without it. It's also essential that both the body and the genitals can be used to make a fully functional vulva situation, and so not being able to do that means I'll have to do clean-up in other software. It's unfortunate and I wish I'd paid more attention to it.

Overall, though, the experience of modelling in this tool is still a lot more comfortable. I'm not focused on the wording or even the parameters so much; I feel more like I'm moving and feeling my way through working with the body, rather than focusing on what the particular parameters are. I apply a modifier if I want to and if I like the way it looks, but I'm not focused on the label per se or necessarily always on the "whole" body. Rather I'm looking at the aesthetic qualities of various parts of the body and feeling them through, thinking about what they communicate emotionally, how they make me feel and how they might make others feel. There was a moment when a participant said that the details and uncontrollability at certain points made them feel like the models produced by this tool reminded them of people they knew, and I see that too. Maybe it's because the seed's been planted, but I do find that really resonant. I see parts of other peoples' bodies and of my own in modelling figures using this tool, and I also see my own emotional expression more clearly. I really feel feeling through it.

19 February 2020



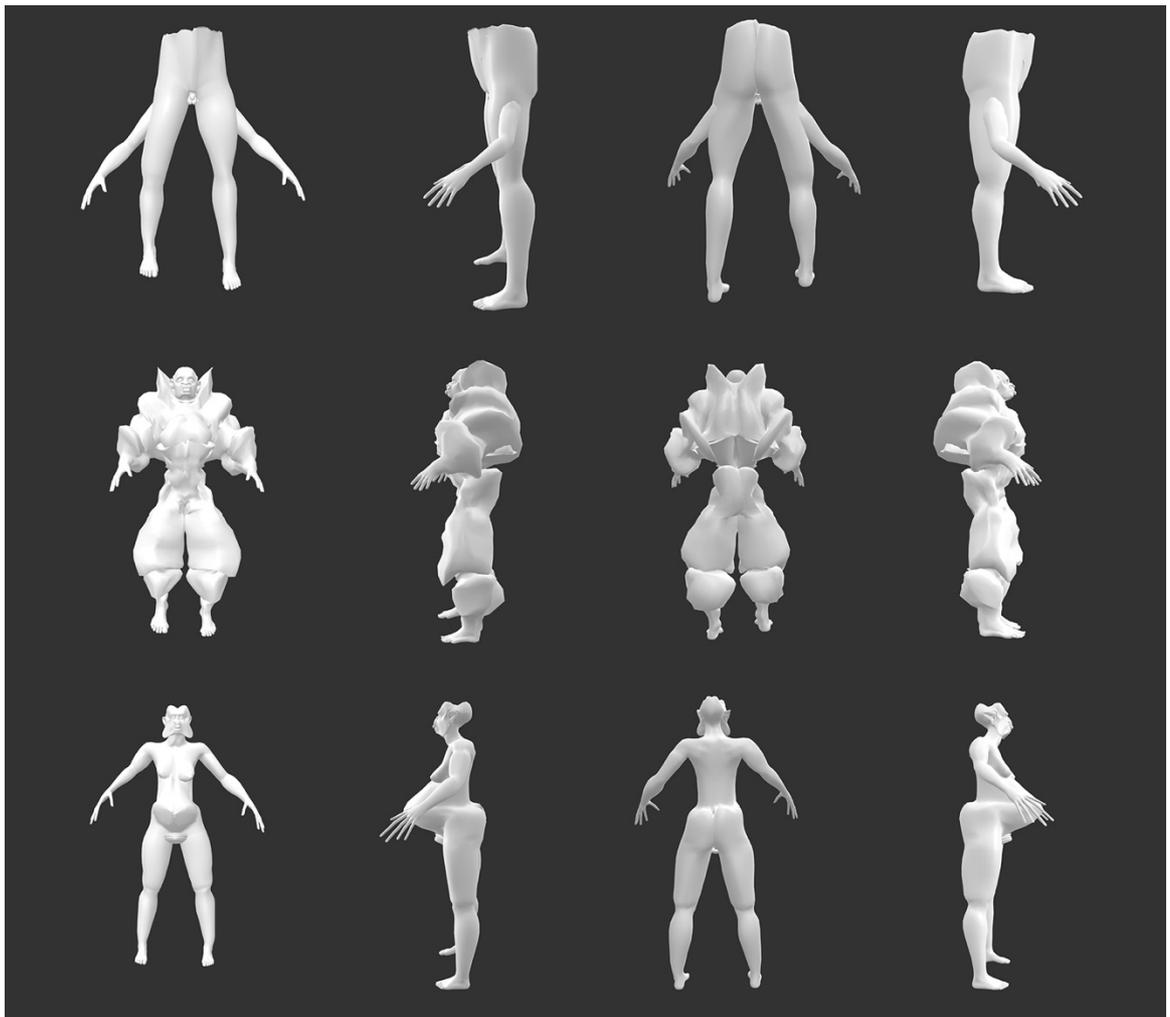
Front, Left, Back, and Right views of model(s) created

Today I finally tried the wibbly, flowery effect that one of the full body modifications does when it's pulled to the extreme, and I really, really enjoyed that. I think I would like to make a little series of those, when thinking of it now. A thing I noticed today when modelling was how much the breasts reminded me of actual human breasts. They were a little asymmetrical, and so I tried to make them a bit more symmetrical. I couldn't get them exactly symmetrical though, and that felt really right; as much as they are similar, they aren't a perfect mirror of one another. Even though the model and I are different shapes, it made me think of my own body and how different parts of my body are approximately that symmetrical. Similar, but not the same, and really variable and imperfect.

Something is happening here that feels like a big shift in terms of my 3D modelling experience. My first entry into this was trying to make avatars of my friends, realizing how much they didn't look like them (in addition to all the messed up stuff with these tools that led to that), getting frustrated, approximating, and then playing with that 'perfection' that I couldn't really get away from in 3D. Even when I'd try to modify something to be 'imperfect', it felt unrealistic or like it revealed more about the

underlying structure of the modelling mesh than about being ‘immersive’ or expressive in any way with the body. This feels like something different. That perfection is totally shattered; even if I want to make it ‘perfect’, I sort of can’t, or rather, the amount of effort that it would take to do so isn’t really worth it. There’s a kind of smoothness that a lot of 3D models have that this just doesn’t; the surface is super rough. That’s actually a place where the genital area bothers me; working between the two meshes, you do get that weird exposed mesh feeling in that area, and I would like to change that.

20 February 2020



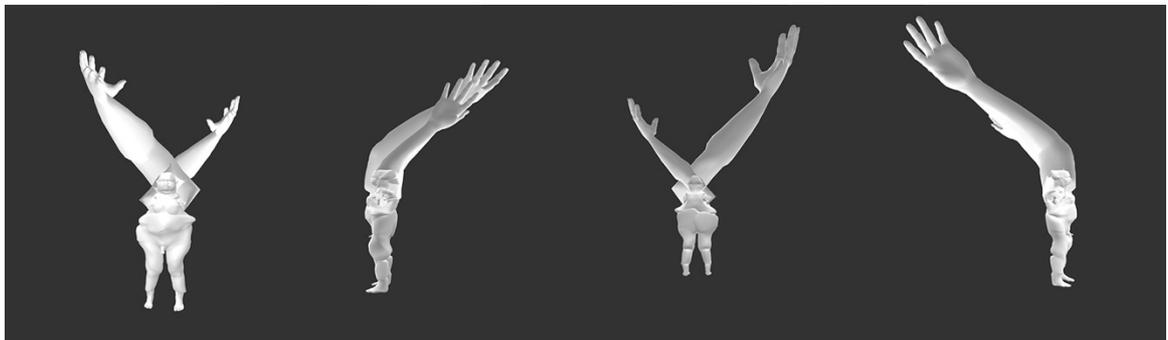
Front, Left, Back, and Right views of model(s) created

Right at the end I had a fun thing happen, where I compressed the middle of the body so that the arms were coming through the thighs and the head was buried in the midsection, with the body cut off at the hips. It was very cool, as well as expressive and evocative. I did it and immediately knew that that model was complete, whereas before I’d felt ambivalent and like I wasn’t sure how soon that particular

figure would be done. Then, suddenly, one modification and it's complete. It really reminds me of a joy I don't often feel when using digital media, where it feels so easy to just tinker and tinker and adjust forever. I'm so used to that in physical, analogue media; I reach a point where a piece feels finished, I usually can't tell when it's coming, but once it happens I know immediately that it's done. It's an irrevocable moving from one state to another. I really miss that when I'm working digitally, which I've done a lot of over the past six years. It's so satisfying and for me drains tension out of my body. I instantly had that feeling.

I also made two other models. One became wibbly again, which I liked and just wanted to save (not the same instantaneous feeling, but I think that I said before that I wanted to make a series, and I liked it). I do really enjoy the way this effect makes the whole thing look somewhere between couture and body armour, protected, structured, organic, floral. The other, I made the penis very wide early on, which I enjoyed expressively (making a phallic object non-phallic), and played with other aspects of the body, including adding a belly and making the lips wider and the eyes more open. I also stretched the fingers out to match the belly. Then I made the face butterfly shaped by exaggerating the face shape, which gave the whole thing and overall effect of stretching toward the front of the body, floating forward. The movement of the body feels both organic and involuntary, an uncanny valley ooze with some animal and human and neither features.

24 February 2020



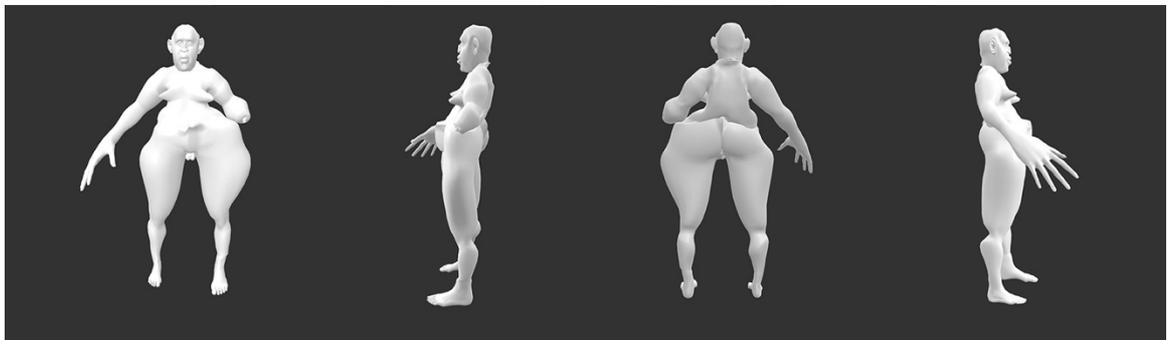
Front, Left, Back, and Right views of model(s) created

I was thinking about how using this tool changes my process. This is definitely influenced by reading the interviews, but I've been thinking about what the unexpectedness or randomness gives me in terms of my work. I realized today that the reason I haven't been screen recording with sound for my own practice, apart from the fact that I don't generally narrate aloud to myself when I work, is that I've been listening to podcasts/music while I've been using the tool. This is something I can't do when I 3D model or use MakeHuman, etc. With 3D modelling, I'm usually either having technical problems or too focused on making sure I don't forget a step to be able to listen to and focus on something

consistently; in MakeHuman and similar, I'm usually too focused on making the figure look a certain way, questioning how it looking that way serves my concept, or feeling uncomfortable with some aspect of the software tool to focus on something else at the same time or feel relaxed. I've missed having something where I can just be creative and not focus so hard on creating, such that I went back to collage and embroidery, two things I hadn't done in years, at various points in my MFA and PhD, because those media do that for me. Having something digital I can do that with feels like such a relief, and a return to a kind of practice where I don't think so much about control (at least in the early stages).

I have another thing where I ended up with giant hands on this one, which expressively I found really interesting and sought to accentuate. When the first one happened, I was trying to make it disappear, but then I realized that I could make it huge. Fun! So I did the other. I was feeling that there was some torso homogeneity in the models I've made lately, so I tried to change this one up, but I'm not sure how much I actually did. Some of the drag functions still work backwards at times; I know why that is with some of them, others it seems like a glitch. I also did something to do the in program save function, such that it doesn't accurately save the figure. It's interesting in that it gives me another variation on the same theme, but I also should try and fix it.

28 February 2020

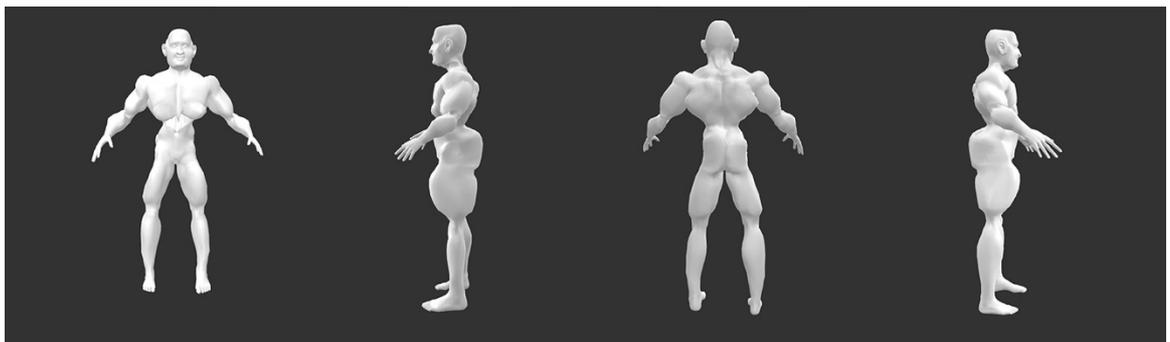


Front, Left, Back, and Right views of model(s) created

I'm pretty tired and not feeling great, but it was nice to have some time to sit down with this this evening. I'm noticing more and more that I think there are some errors happening with the assignment of certain modifiers; I need to look into that a little more closely and play with it. There's some modifiers that don't seem to be there or working as expected, which is unfortunate. Still, I made something and found it pretty enjoyable. It actually is really hard to make something symmetrical! I have gotten pretty good at it on the limbs, but for whatever reason, the hips just didn't work, and it was really good inspiration to work around that. I wanted a sort of Venus of Willendorf situation initially, but got one hip way out and had a hard time finding a middle ground with the other one. I considered dragging the other one way out, but I had the giant hand on that side and it felt like it sort

of imbalanced it. In the end I think the hips balanced the rest of the body out compositionally, and with having made the one large hand and the other side having no hand, I liked it a lot. It's also interesting to me on a purely personal level because I'm having a bit of a typing induced RSI at the moment, so the hands were both purposeful and meaningful. My hand hurts, I did weird shit to the hands, mild catharsis. Sometimes that's what's great about art. It's like whining about my body hurting, being tired, etc., but instead of screaming into the void or rehashing something I've already talked about with someone (that, especially in the case of physical stuff, they can't do anything about), I get to make something cool with that feeling and feel at least emotionally unburdened. It's expressive and pretty instrumental in my mental health being better. I've been trying to find a way to do something like this with bodily forms for a long time, but I was so precious about it that it was hard to snap out of that mindset. In 3D digital, I struggled with how technical the tools were and everything I talked about in the previous entry, and in analogue stuff, I think there's still a lot of weight given to being able to draw humans "realistically" that it's really hard to snap out of. Human bodies are so loaded with so many different ideas and norms. My experience has been that it's a form where it's really difficult to get out of these paradigms, even if your personal politics and understanding would suggest otherwise. I spend a ton of time thinking about this and it was still so hard to move beyond being worried about the body not looking perfect. I don't have that option here (though of course I can and will tweak the software as previously mentioned), and it's bringing about a lot of change. It's nice to just get into it and not have that anxiety or technical worries front of mind.

01 March 2020

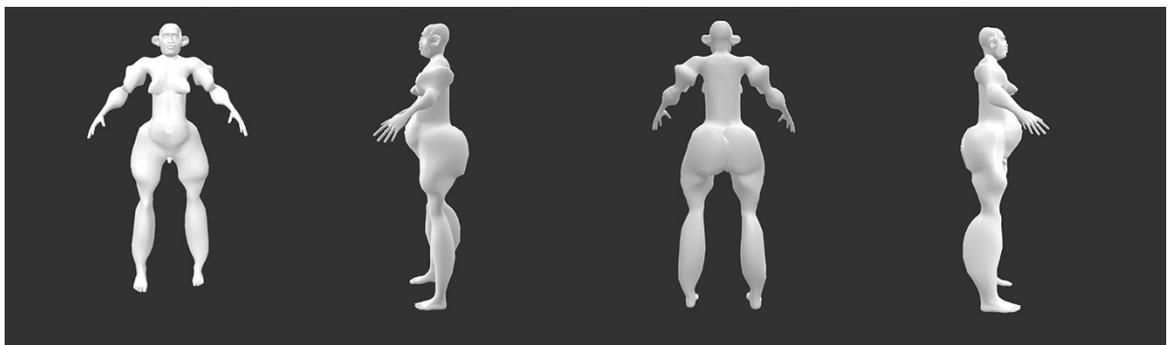


Front, Left, Back, and Right views of model(s) created

Today, I focused on trying to use one of the 'low' modifiers to get something I liked and then make fine detail modifications otherwise. I pretty much did that. My modifications were concentrated on the neck, face, breasts, and genital area. The neck and face were pretty simple, and I actually rediscovered some modifiers I hadn't used as much in the past. I think that if the neck ends up not being very long by the randomizer, for example, you don't see the mesh to modify it, so it was nice to actually

experiment with size and positioning there. I also played around more with the nose and face shape, and tried to go for symmetry to some extent. It's definitely true that I can't really get perfect symmetry with it, but I feel like the kind of symmetry I can get is often more similar to symmetry in nature: Similar but slightly different. I think some of the modifiers in the nose might not be activating, and I'm going to zero in on that and the head shape when I go in to pick up some fixes. The genitals are another problem; I tried for ages and ages to get the shaft to lengthen so I could make it less wide and it turn it into something vaguely clitoral. For whatever reason it just wasn't lengthening. I remember having gotten it to do that in the past, and of course it's programmed to, so I think that's something I have to check in on the next couple times I use it. I ended up making a nice vulva otherwise and having the rest retract, but it was obnoxious. I liked the overall exaggerated muscular effect on the body. The mix of angularity and curve was really appealing. I've been thinking about what one of the workshop participants said about being in the "borderlands of gender identity", how fixed certain characteristics are in so many people's minds in terms of being gendered one way or another, and how to play with that, even in terms of my own perception. What is defining how I am gendering the figures I'm creating here? How? Why? Does that change which results from the randomizer that I choose to work with? I think it does; I'm still making figures that I identify with in certain ways, and gender is one of those, but I'm interested in how that comes up. Something to think about.

07 March 2020



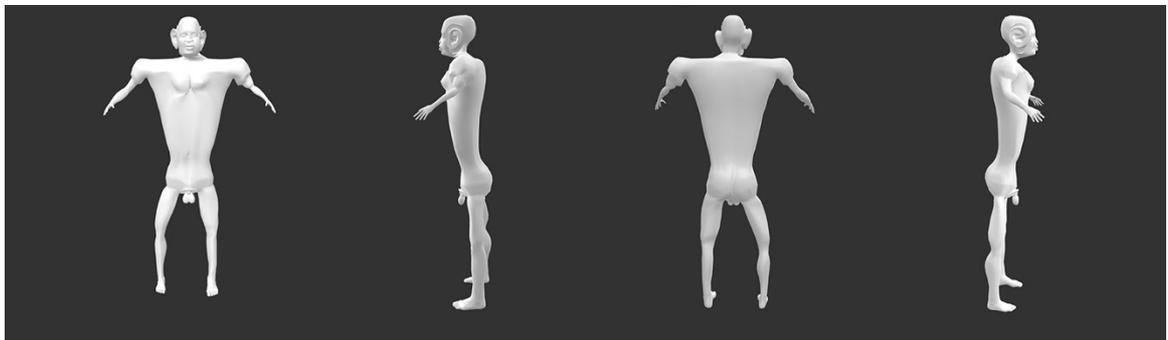
Front, Left, Back, and Right views of model(s) created

I used the tool for about 45 minutes today. It was interesting. Something I've been thinking about and have discussed with Sarah and Rebecca is how I set out to make something usable for novice users, but by the time I was starting that, I was no longer a novice user. I knew how to use 3D modelling software to do what I wanted, and was essentially trying to design backwards to a previous state of my art practice/being. But I'm not capable of doing that necessarily and my needs changed! I didn't need something to make up for or to use instead of 3D skills; I needed something to suggest ideas and to

get me out of ruts in terms of how I'm thinking about the body and how to use it and form it in my work.

I think the unfortunate thing is that I am noticing patterns in the tool, and right now I'm too busy writing and doing other things to fix the things I'm noticing. I'll have time soon and this will definitely get done, but I keep focusing in on the same little frustrating parts, like the cone head and the tool's prevalence toward it. At the same time, though, I'm figuring out (or remembering in practice) where some of the modifiers are and seeing what they do when stretched to extremes. That's also taking me back to how funny some of the original modifiers were on their own; a lot of the modifiers included in MakeHuman don't make sense 'anatomically' unless they're applied together anyway. So I'm feeling a lot more able to make the tool make cool things, make symmetrical things, and conform a little more to me having an idea inspired by the tool and then running with it, rather than playing around aimlessly until I get something I like, which I was doing for long periods before (and is still really fun and I will do again, for the record). I feel like I'm able to get a little more versatility out of the tool (and maybe that's where it's grating at me a little to not have the time to clean up the parts that are making that harder).

16 March 2020

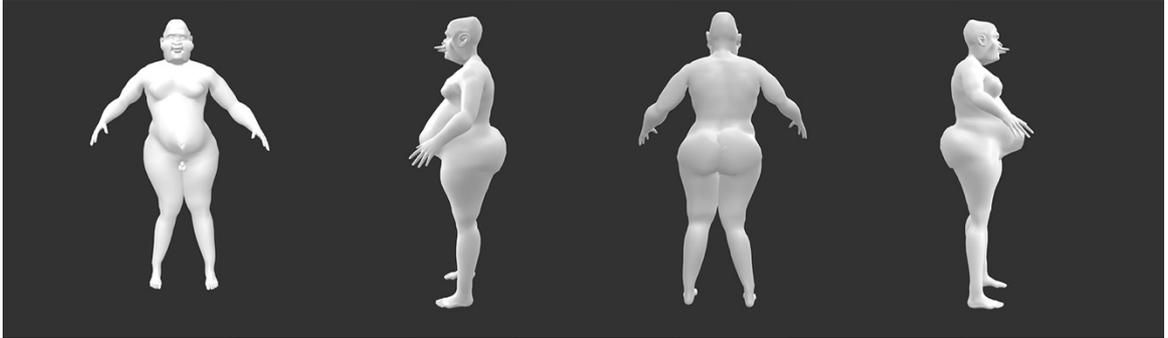


Front, Left, Back, and Right views of model(s) created

Today I wanted to play with how I could squish and squeeze certain parts of the body. I made all of the appendages tiny, which I is one interpretation of squishing or squeezing, depending on how you look at it, and then pushed certain other parts of the body together (breasts, face in particular). I also made the ears symmetrical and tried to make the limbs symmetrical. I still really appreciate that the system makes things that are almost symmetrical but not perfectly. It's so interesting how much that feels like a mimicry of real life and real body characteristics, even when the overall effect is at times really abstract. The body reminds me of a sail, stretched taut in the wind. I think what I'm doing at the moment is making sculptural bodies. Everything's a little representation of an emotion, a particular place, a particular experience. This is really different to what I was doing before, where I was making

very 'realistic' avatars of myself and my own body, down to tattoos and the like. I feel like I'm making aspects of myself, or aspects of how I relate to myself. Ways my body feels, ways my body looks to me some days. It's a chaotic mismatch of emotion and experience and body.

30 March 2020



Front, Left, Back, and Right views of model(s) created

Wow, times have really changed. I've been adjusting to social distancing and leaving my house once a day, if that, for exercise, so there's been some gaps in my creative practice as I've prioritized other needs in this adjustment period. In my work today, I focused on details and rounding out parts of the figure body in proportionate ways. In terms of the rounding, I noticed that some parts, like the stomach and the hips, were already fairly round, and played that up by rounding out the arms (upper and lower) and moving the height of the hips to make them appear rounder. I also rounded the buttocks and changed the breast symmetry in terms of location. With respect to the face, I pulled the lips out into a kind of duck-billed shape, and squeezed the nose down in a similar way. I made an addition to the software in that I made the cone-head less prominent. I still haven't fixed it entirely, but the major area that causes that to show up was amended. So I'm happier with that. I also pulled the cheeks out so they're a bit more rounded and large, and I moved the legs together to finish off the posture. This one feels very the way my body does at the moment; kind of sore and taught and heavy. I have my period at the moment and I'm in a lot of pain in my middle and in my legs, and that's how that feels, kind of round and achy and shiny. I feel compressed and overflowing and constricted, and my body kind of feels like it's getting away from me somehow. The weather's been beautiful, everything's anxious, it feels quiet and calm but too quiet and all I can hear are sirens. My body feels exhausting and exhausted.

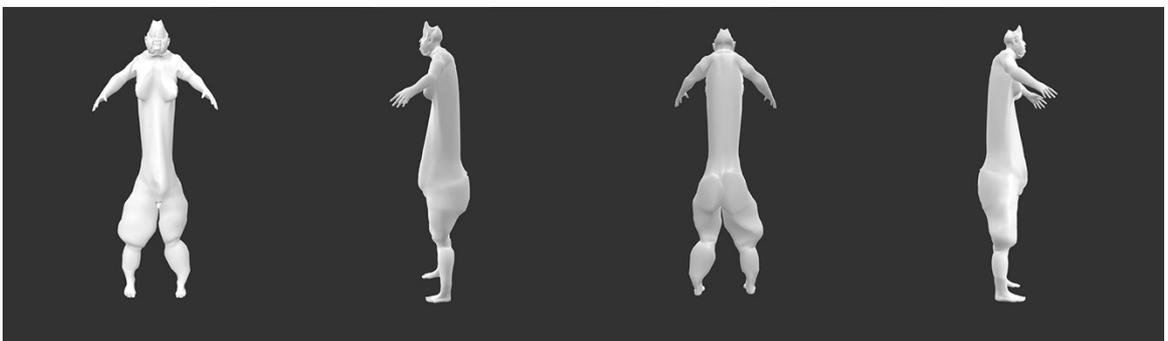
24 April 2020



Front, Left, Back, and Right views of model(s) created

I had a short session using the tool tonight. It feels good to have something I feel comfortable picking up for a little bit, messing around with, and putting down, without feeling like I have to make something technically intense, change all of the settings intricately, or spend a lot of time if I don't have it or don't feel like it. It's nice to go back to a more casual, less pressured way of making art where I don't feel bad about myself so often. Today, I used the randomizer until I got a shape that I liked, and then pulled parts out until I liked the shape. The arms I felt were particularly good; they sort of reminded me of the floaties or 'water wings' that kids or people who can't swim well wear. They also reminded me of bearded dragons and cats and animals that puff up a part of their body when they get scared or alarmed. I think on Chaudhuri's scale they'd probably rate pretty dangerous. I also pulled both the back of the head and the back out, and I liked the way those two dovetailed together. I moved some other parts of the body around too. I liked how casual this felt, though. I know what I did, but I also didn't overthink it, and that feels refreshing.

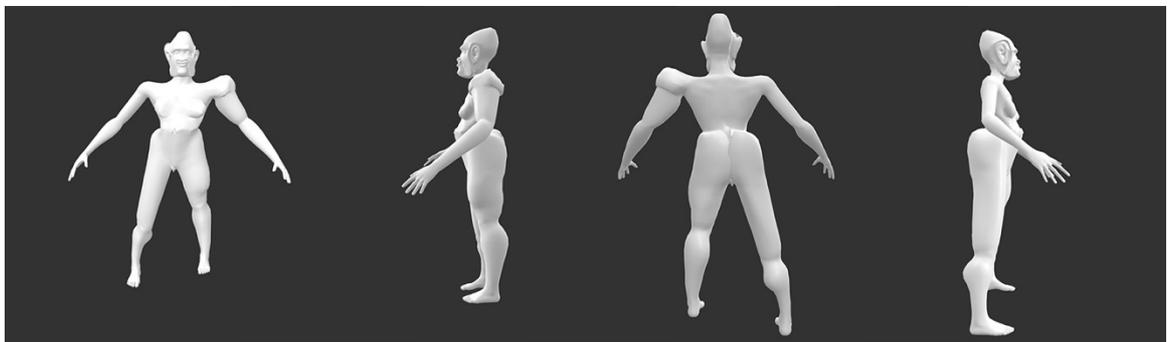
26 April 2020



Front, Left, Back, and Right views of model(s) created

Another short one and I let this one surprise me. That wasn't my intention when I started, but I decided to just go with the first figure the system showed me and try and make something with that. I stretched the mid-section out and it wasn't quite right at first, but I liked the effect and tried playing with it a little, seeing if more or less and how much more or less felt good. I made a crown-like shape on the head and enjoyed that and kept it, and the rest of the face followed from there. I wasn't planning to be done with it, and then I looked at it at 11:25 and was happy with it, surprised, and left it. It was a snap decision but I felt very comfortable. I also made the lips mimic the crown shape and was pleased with that continuity. I played around with the material colour a bit and selected another one (sort of a powder pink), but since the colour doesn't come through in the program when they're exported and opened, I have been leaving this step out since I'll do it again and with more sophistication in the general tool. I also made the legs a bit rounder and sort of tried to make them more symmetrical, but enjoyed how much these two weren't interested in that and how complementary they ended up being; both similar and different. I rounded out the butt, too. I find this to be a very complete sculpture, minus posing. It feels balanced, detailed and unique and I appreciate getting that kind of result with about 20 minutes of work. I feel able to be flexible with my goals and creative without putting a lot of pressure on myself.

29 April 2020

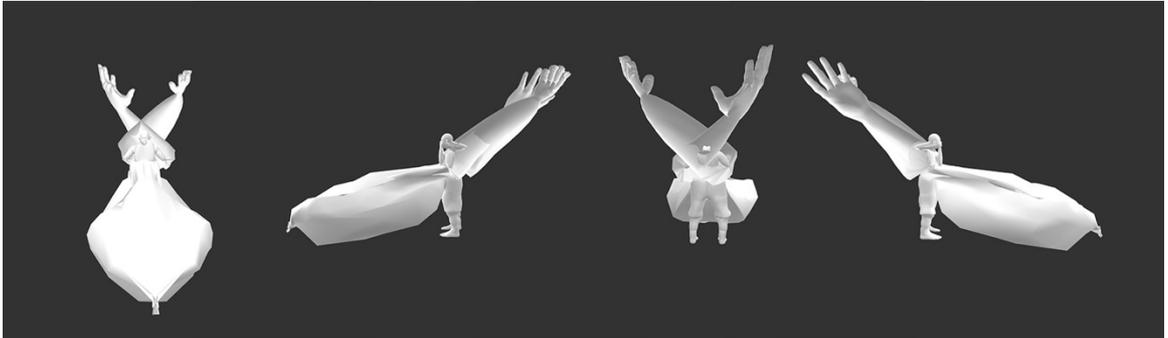


Front, Left, Back, and Right views of model(s) created

Another short one, I really only spent around 15 minutes on this and I'm pretty happy with it. It's not one of my favourites but I again tried to go with what I was given by the system and build from there. I really liked the bilateral asymmetry this one had going on, and I decided to play that up, making the arms even bigger to match the legs, both in circumference and definition. The effect of the ear, with the very sensuous ripple when I made it slightly bigger, was so lovely that I instantly fell in love with it and left it. I also managed to invert and make the penis giant at one point, which was amazing but didn't go with the overall vibe, so I'll try that on the next one I do. I liked the torso as in the original, it is asymmetric and there were strong angles to the left side, which I felt went well with the theme. I

did not do much to the face or back. Again, this felt casual and low stakes and lovely. Engaging with art as a less pressured thing is extremely necessary sometimes.

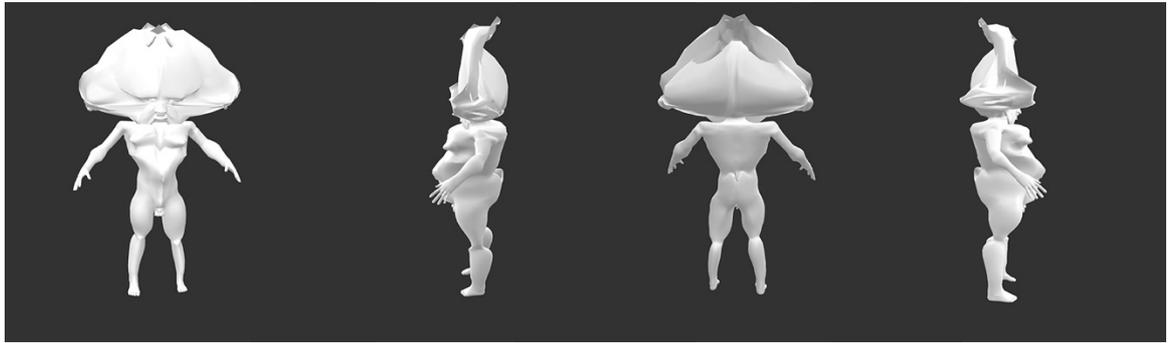
08 June 2020



Front, Left, Back, and Right views of model(s) created

Today I modelled for around 30 minutes. I wasn't going in wanting anything in particular, and I'm pretty tired at the moment from writing, so I was having trouble feeling inspired by the randomizer or anything else. I was fiddling around with the arms after settling on a figure, and made them huge and inverted them behind the figure's head. After that, I started expanding the body, making as maximally large as possible. I really enjoy being able to merge different parts of the mesh into one another, creating an amorphous, continuous shape which is human and often has a human face for sure, but also has a topography, a landscape of feeling and self and being. I feel taken away from the aesthetic that a lot of 3D figures end up having, where it's very sanitary, the most ideal human possible within a network of terrible control apparatuses. It reminds me of P12 and calling the figure a barbie; it really did often feel like a barbie, plastic, continuous and not very interesting, a stand in for human consciousness stripped down to being just enough for it to be recognizable but sanitary. I really hate this idea that digital stuff has to be very sanitary and technically perfect and clean. This tool creates things that feel really messy and exuberant and strange and I love that. It always feels like to get that kind of stuff I have to work really hard or have the idea in advance and that always ends up contrived, because it's not what the tools are made with in mind and they grate when one tries to. Or maybe the training does, I don't know. Probably a combination of both. I think a lot of digital tools just aren't made to go past a certain point, and once one does, they either crash or produce results that aren't viable. It's not perfect, but I've managed to make something that does do that, and maybe it not being perfect is in fact the point. It's so nice to make something and not feel a ton of pressure to get it "right" at that stage, or to know what "right" is, even. I get to play. I took out the cone head and a couple other smaller details, or moved them around, which is resulting in randomizer results that are closer to what I find interesting and want to work with.

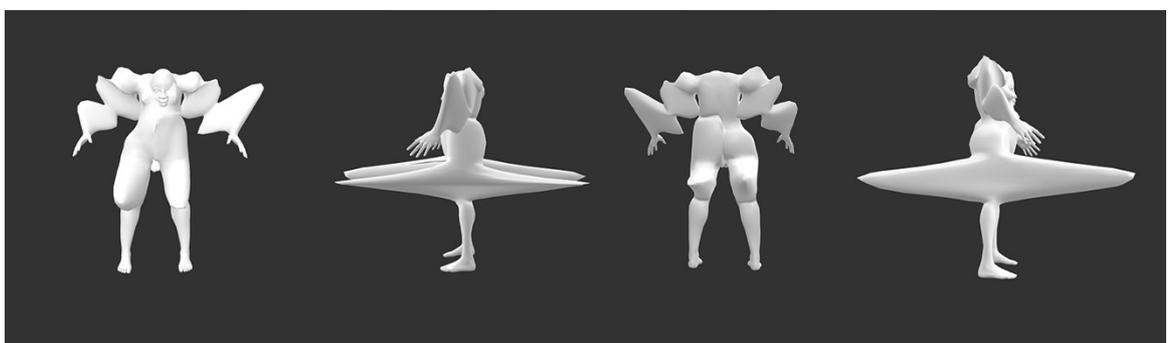
10 June 2020



Front, Left, Back, and Right views of model(s) created

Today was a short, 15 minute session. I didn't have a lot of time, but I did want to make something fun and unwind, and this session achieved that. I don't normally tend to go for shorter figures when the randomizer suggests them. I think my own bias is at play there to some degree. I think that I read smaller figures as potentially child-like and, since my work deals with sexuality, tend to disconnect or be wary of unintentionally drawing any connection by making a figure from that kind of template. Still, this one reminded me of a humpty dumpty cartoon, and so I went for it. I was very entertained by pulling the nose and lip to converge, and pleasantly surprised by the scrambling of the head. It looks like a stingray/explosion crossover which is great and novel. The system does a weird crunching thing to the genitals that I'm not very happy with, but otherwise, I enjoyed this and it was an excellent way to clear my head and let off a little bit of steam after a long day.

15 June 2020



Front, Left, Back, and Right views of model(s) created

Tonight's session with the tool was longer. I'd intended to do a short one, in the evening after I finished work, but I got into it and spent about 30 minutes modelling in the tool. I started out trying to find a

way in, not feeling super excited by the models the randomizer was giving, then started maximizing the depth of the limbs. I do really enjoy the kind of anal bead abstraction that comes out of that. It's a weird thing about having the facegroups and targets, that basically, if you push the modifiers past a certain point, the hard edges of them start to show. I know participants in the workshop didn't like this at all, that the shape becomes broken up, but I really like it as a facet of the material. The shape becomes kind of blocky, but not in a traditional, pixelated or cartoonish way, all of the 'anatomical' aspects are highlighted clearly and the effect is quite sculptural and uncanny valley.

After that, I collapsed the head into the chest. I've either gotten that to happen so that it drops away totally out of view, or so it's kind of in the neck cavity before, but this one lodged a little off-centre between the breasts and it was very cool. I then moved one of the breasts onto the face, covering one eye. The nipple became the eye. It was wonderful and satisfying. I feel excited about the work I'm making these days, even if I'm often too busy to do the full-scale execution of the whole project as I'd like. I really enjoy making these weird, overlapping pieces and then making them transparent, the way the overlaps 3D modelling discourages refract the digital lighting in new ways. This feels really new and fresh and inspiring, and that's a nice way to feel about making art, on a day to day level. It's great to feel art as a bright spot and a reprieve, a break from everything else going on and a source of possibilities in a moment of life transition.

APPENDIX I ART PRACTICE DIARY: ANALYSIS CODES

Initial Theme Codes	Description	Sources	References	Example
Balancing artist and developer mindsets	Moments where this balance is clearly described	1	19	I feel like I'm able to get a little more versatility out of the tool (and maybe that's where it's grating at me a little to not have the time to clean up the parts that are making that harder).
Changes in modelling priorities	When I describe shift in priorities from using previous tools	1	19	I wasn't worried about trying to give it attractive features, modelling it after someone I might find hot in an idealized form, or trying to make a unified whole; rather, I focused on characteristics I found interesting.
Description of manipulations	Describing manipulations to the figure	1	26	Today I finally tried the wibbly, flowery effect that one of the full body modifications does when it's pulled to the extreme, and I really, really enjoyed that.
Feeling annoyed	Feeling annoyed while using the tool	1	4	The system does a weird crunching thing to the genitals that I'm not very happy with, but otherwise, I enjoyed this and it was an excellent way to clear my head and let off a little bit of steam after a long day.
Feeling inspired	Feeling inspired by using the tool	1	18	I have another thing where I ended up with giant hands on this one, which expressively I found really interesting and sought to accentuate. When the first one happened, I was trying to make it disappear, but then I realized that I could make it huge.
Feeling relief	Feeling relief or similar positive affect	1	16	It was really exciting, and a relief to be engaging purely as an artist on some level.
Happy with randomizer results	Describing feeling happy with the results of the randomizer or inspired by it	1	7	In this instance, I was pretty happy with the characteristics that the randomizer generated off the bat.
Problems with the tool	Describing issues with the tool	1	11	It still definitely has a lot of problems. Many of the drag functions don't actually work in the directions that they're supposed to, some don't seem to respond well to really light modifications, and the 'back' function selectively doesn't work.
Sketching for the first time	Describing using the tool to sketch or explore ideas	1	34	Still: in terms of sketching a human figure, this was a big moment for me. It's the first time that I've felt like I was truly sketching, rather than modifying someone else's 'barbie'.
The figure	Description of the figure in the text	1	41	Even though the model and I are different shapes, it made me think of my own body and how different parts of my body are approximately that symmetrical. Similar, but not the same, and really variable and imperfect.
Balancing artist and developer mindsets/Child	Description	Sources	References	Example

Codes				
Commentary and notes to self about what needs to be changed	Instances of commentary and developer notes in diary text	1	5	Actually, I just checked the mesh issue with the groin and it seems like it only happens when the human+genital geometry is applied; that's kind of a problem and something that needs to be solved in the future.
Development brain interrupting art	Interruption of developer thoughts or description of same	1	6	I think the unfortunate thing is that I am noticing patterns in the tool, and right now I'm too busy writing and doing other things to fix the things I'm noticing.
Discussion of journey	Discussion of journey over course of research	1	1	Something I've been thinking about and have discussed with Sarah and Rebecca is how I set out to make something usable for novice users, but by the time I was starting that, I was no longer a novice user. I knew how to use 3D modelling software to do what I wanted, and was essentially trying to design backwards to a previous state of my art practice/being. But I'm not capable of doing that necessarily and my needs changed! I didn't need something to make up for or to use instead of 3D skills; I needed something to suggest ideas and to get me out of ruts in terms of how I'm thinking about the body and how to use it and form it in my work.
Justifying choices	Justifying development choices	1	8	The way I have things working at the moment means that that's essential - the figure won't export without it. It's also essential that both the body and the genitals can be used to make a fully functional vulva situation, and so not being able to do that means I'll have to do cleanup in other software.
Relating and comparing to study participants	Mention and comparison or relation to participants in workshop study	1	3	I was thinking about how using this tool changes my process. This is definitely influenced by reading the interviews, but I've been thinking about what the unexpectedness or randomness gives me in terms of my work.
Changes in modelling priorities/Child Codes	Description	Sources	References	Example
Away from idealized form	Priority shift away from idealized form	1	1	I wasn't worried about trying to give it attractive features, modelling it after someone I might find hot in an idealized form, or trying to make a unified whole; rather, I focused on characteristics I found interesting.
Away from symmetry	Priority shift away from symmetrical bodies	1	2	I appreciated the lack of symmetry that I built in to the system. I think that the lack of symmetry was an aspect, actually, that made the figure feel more 'real'. My body isn't symmetrical visually, and I think that's true for most people; I think this was a big contribution toward the experience feeling less like modifying a 3D doll and more like a beginning prototype for a complex object.

Toward difference	Priority shift toward uniqueness and difference	1	5	I also felt, though, that the system allowed certain characteristics to come through much more than MakeHuman ever did (fatness, squashed faces, weird nose shapes, rolls here)
Toward expression	Priority shift toward expression and expressiveness	1	3	I think what I'm doing at the moment is making sculptural bodies. Everything's a little representation of an emotion, a particular place, a particular experience. This is really different to what I was doing before, where I was making very 'realistic' avatars of myself and my own body, down to tattoos and the like. I feel like I'm making aspects of myself, or aspects of how I relate to myself. Ways my body feels, ways my body looks to me some days. It's a chaotic mismatch of emotion and experience and body.
Toward serendipity	Priority shift toward serendipity and surprise	1	5	I didn't need something to make up for or to use instead of 3D skills; I needed something to suggest ideas and to get me out of ruts in terms of how I'm thinking about the body and how to use it and form it in my work.
Toward sketching and relaxation	Priority shift toward sketching and exploration/relaxation	1	3	I had a short session using the tool tonight. It feels good to have something I feel comfortable picking up for a little bit, messing around with, and putting down, without feeling like I have to make something technically intense, change all of the settings intricately, or spend a lot of time if I don't have it or don't feel like it. It's nice to go back to a more casual, less pressured way of making art where I don't feel bad about myself so often.
Toward versatility	Priority shift toward versatility of tool in representation	1	1	At the same time, though, I'm figuring out (or remembering in practice) where some of the modifiers are and seeing what they do when stretched to extremes. That's also taking me back to how funny some of the original modifiers were on their own; a lot of the modifiers included in MakeHuman don't make sense 'anatomically' unless they're applied together anyway. So I'm feeling a lot more able to make the tool make cool things, make symmetrical things, and conform a little more to me having an idea inspired by the tool and then running with it, rather than playing around aimlessly until I get something I like, which I was doing for long periods before (and is still really fun and I will do again, for the record). I feel like I'm able

				to get a little more versatility out of the tool (and maybe that's where it's grating at me a little to not have the time to clean up the parts that are making that harder).
Description of Manipulations/Child Codes	Description	Sources	References	Example
Abstraction	Language used to describe manipulations in the text	1	4	I was very entertained by pulling the nose and lip to converge, and pleasantly surprised by the scrambling of the head. It looks like a stingray/explosion crossover which is great and novel.
Balance	Language used to describe manipulations in the text	1	3	I considered dragging the other one way out, but I had the giant hand on that side and it felt like it sort of imbalanced it.
Cohesive and preserving smaller details	Language used to describe manipulations in the text	1	1	keeping it in more of a cohesive form but preserving these smaller details, and in this instance I chose to do that
Compression	Language used to describe manipulations in the text	1	5	Right at the end I had a fun thing happen, where I compressed the middle of the body so that the arms were coming through the thighs and the head was buried in the midsection, with the body cut off at the hips.
Continuity	Language used to describe manipulations in the text	1	1	I also made the lips mimic the crown shape and was pleased with that continuity.
Disappear	Language used to describe manipulations in the text	1	1	When the first one happened, I was trying to make it disappear, but then I realized that I could make it huge.
Floating	Language used to describe manipulations in the text	1	1	Then I made the face butterfly shaped by exaggerating the face shape, which gave the whole thing and overall effect of stretching toward the front of the body, floating forward.
Flowy and abstract	Language used to describe manipulations in the text	1	2	There was a moment where I chose between making the whole body more flowy and abstract
Genital	References to body part	1	4	The penis I tried to make small enough to be a clit,
Giant	Language used to describe manipulations in the text	1	7	I have another thing where I ended up with giant hands on this one, which expressively I found really interesting and sought to accentuate.
Invert	References to manipulation	1	2	I also managed to invert and make the penis giant at one point, which was amazing but didn't go with the overall vibe, so I'll try that on the next one I do.
Leg shorter	References to manipulation	1	2	primarily about not having the little foot hanging off the end of the leg, so shortening the lower leg as well rather than doing it all from the upper leg
Looking intentional	Effect of manipulation	1	1	went about making that change look a little more intentional
Playing	Experience of manipulation	1	4	I'm looking forward to playing with these forms more.
Rediscovering modifiers	Experience of manipulation	1	1	The neck and face were pretty simple, and I actually rediscovered some modifiers I hadn't used as much in the past.

Sensuous	Language used to describe manipulations in the text	1	2	The rolls on the upper legs I found very appealing and sensuous, and I accentuated those.
Simple	Language used to describe manipulations in the text	1	1	The neck and face were pretty simple
Stretching	Effect of manipulation	1	7	I also stretched the fingers out to match the belly.
Strong angles	Language used to describe manipulations in the text	1	1	I liked the torso as in the original, it is asymmetric and there were strong angles to the left side, which I felt went well with the theme.
Symmetry	References to manipulation	1	7	They were a little asymmetrical, and so I tried to make them a bit more symmetrical. I couldn't get them exactly symmetrical though, and that felt really right; as much as they are similar, they aren't a perfect mirror of one another.
Widening and rounding	Effect of manipulation	1	7	In terms of the rounding, I noticed that some parts, like the stomach and the hips, were already fairly round, and played that up by rounding out the arms (upper and lower) and moving the height of the hips to make them appear rounder. I also rounded the buttocks and changed the breast symmetry in terms of location.
Feeling annoyed/Child Codes	Description	Sources	References	Example
Empathizing with participants	Feeling annoyed by the tool in ways that are similar to those expressed by participants in workshop study	1	1	This annoyed me as an artist! I have a lot more empathy for my participants on some level.
Feeling tired	Feeling tired while using the tool	1	1	I'm pretty tired and not feeling great, but it was nice to have some time to sit down with this this evening. I'm noticing more and more that I think there are some errors happening with the assignment of certain modifiers; I need to look into that a little more closely and play with it. There's some modifiers that don't seem to be there or working as expected, which is unfortunate.
Noticing patterns	Noticing patterns in what the tool makes or facilitates making	1	2	I think the unfortunate thing is that I am noticing patterns in the tool, and right now I'm too busy writing and doing other things to fix the things I'm noticing. I'll have time soon and this will definitely get done, but I keep focusing in on the same little frustrating parts, like the cone head and the tool's prevalence toward it.
Feeling inspired/Child Codes	Description	Sources	References	Example
A fun thing happened	Moment of inspiration	1	2	Right at the end I had a fun thing happen, where I compressed the middle of

				the body so that the arms were coming through the thighs and the head was buried in the midsection, with the body cut off at the hips.
Absences of smoothness	Moment of inspiration	1	2	This feels like something different. That perfection is totally shattered; even if I want to make it 'perfect', I sort of can't, or rather, the amount of effort that it would take to do so isn't really worth it. There's a kind of smoothness that a lot of 3D models have that this just doesn't; the surface is super rough.
Ended up with opposite effect and liked it	Moment of inspiration or suggestion	1	1	I have another thing where I ended up with giant hands on this one, which expressively I found really interesting and sought to accentuate. When the first one happened, I was trying to make it disappear, but then I realized that I could make it huge. Fun!
Expressive	Effect of inspiration	1	5	It was very cool, as well as expressive and evocative.
Flashes of realism	Effect of inspiration	1	2	I still really appreciate that the system makes things that are almost symmetrical but not perfectly. It's so interesting how much that feels like a mimicry of real life and real body characteristics, even when the overall effect is at times really abstract.
Getting into it	Effect of inspiration	1	1	Tonight's session with the tool was longer. I'd intended to do a short one, in the evening after I finished work, but I got into it and spent about 30 minutes modelling in the tool.
Have ideas and play	Effect of inspiration	1	5	So I'm feeling a lot more able to make the tool make cool things, make symmetrical things, and conform a little more to me having an idea inspired by the tool and then running with it, rather than playing around aimlessly until I get something I like, which I was doing for long periods before (and is still really fun and I will do again, for the record).
Immediately knew it was complete	Moment of inspiration	1	4	I did it and immediately knew that that model was complete, whereas before I'd felt ambivalent and like I wasn't sure how soon that particular figure would be done. Then, suddenly, one modification and it's complete.
Imperfection	Moment of inspiration	1	2	This feels like something different. That perfection is totally shattered; even if I want to make it 'perfect', I sort of can't, or rather, the amount of effort that it would take to do so isn't really worth it. There's a kind of smoothness that a lot of 3D models have that this just doesn't; the surface is super rough.
Inspired to make more like that	Moment of inspiration or suggestion	1	1	I think I would like to make a little series of those, when thinking of it now.
Liked it and tweaked it	Effect of inspiration	1	2	Another short one and I let this one surprise me. That wasn't my intention when I started, but I decided to just go with the first figure the system showed me and try and make something with that. I stretched the mid-section out and it wasn't quite right at first, but I liked the effect and tried playing with it a

				little, seeing if more or less and how much more or less felt good.
Used an effect I knew	Knowing where to find inspiration	1	2	Today I finally tried the wibbly, flowery effect that one of the full body modifications does when it's pulled to the extreme, and I really, really enjoyed that.
Wasn't what I was going for	Effect of inspiration	1	4	I think I then went to make the leg shorter, and it fully retracted, which I wasn't going for, but once I saw it I was excited and went about making that change look a little more intentional (primarily about not having the little foot hanging off the end of the leg, so shortening the lower leg as well rather than doing it all from the upper leg).
Working around	Moment of inspiration or suggestion	1	1	I have gotten pretty good at it on the limbs, but for whatever reason, the hips just didn't work, and it was really good inspiration to work around that.

Feeling relief/Child Codes	Description	Sources	References	Example
A relief to be engaging purely as an artist	en vivo	1	2	a relief to be engaging purely as an artist
Feeling my way through	en vivo+	1	1	I'm not focused on the wording or even the parameters so much; I feel more like I'm moving and feeling my way through working with the body, rather than focusing on what the particular parameters are.
Feeling satisfied	Satisfaction with the tool and experience of modelling	1	3	It's an irrevocable moving from one state to another. I really miss that when I'm working digitally, which I've done a lot of over the past six years. It's so satisfying and for me drains tension out of my body. I instantly had that feeling.
Getting past paradigms	Getting past previous representations and use of tools	1	1	My experience has been that it's a form where it's really difficult to get out of these paradigms, even if your personal politics and understanding would suggest otherwise. I spend a ton of time thinking about this and it was still so hard to move beyond being worried about the body not looking perfect. I don't have that option here (though of course I can and will tweak the software as previously mentioned), and it's bringing about a lot of change. It's nice to just get into it and not have that anxiety or technical worries front of mind.
Getting past technical anxiety	Relief due to lack of technical anxiety	1	5	With 3D modelling, I'm usually either having technical problems or too focused on making sure I don't forget a step to be able to listen to and focus on something consistently;
Immersed in the activity	Experience of immersion	1	1	I realized today that the reason I haven't been screen recording with sound for my own practice, apart from the fact that I don't generally narrate aloud to myself when I work, is that I've been listening to podcasts/music while I've

				been using the tool. This is something I can't do when I 3D model or use MakeHuman, etc. With 3D modelling, I'm usually either having technical problems or too focused on making sure I don't forget a step to be able to listen to and focus on something consistently; in MakeHuman and similar, I'm usually too focused on making the figure look a certain way, questioning how it looking that way serves my concept, or feeling uncomfortable with some aspect of the software tool to focus on something else at the same time or feel relaxed. I've missed having something where I can just be creative and not focus so hard on creating, such that I went back to collage and embroidery, two things I hadn't done in years, at various points in my MFA and PhD, because those media do that for me. Having something digital I can do that with feels like such a relief, and a return to a kind of practice where I don't think so much about control (at least in the early stages).
Modelling as comfortable	Relief and comfort	1	5	the experience of modelling in this tool is still a lot more comfortable.

Happy with randomizer results/Child Codes	Description	Sources	References	Example
Happy off the bat	Feeling about randomizer results	1	1	In this instance, I was pretty happy with the characteristics that the randomizer generated off the bat.
Having trouble feeling inspired by anything	""	1	1	Today I modelled for around 30 minutes. I wasn't going in wanting anything in particular, and I'm pretty tired at the moment from writing, so I was having trouble feeling inspired by the randomizer or anything else.
Make something based on what the randomizer gives me	""	1	2	It's not one of my favourites but I again tried to go with what I was given by the system and build from there.
Optimized the randomizer results	""	1	1	I took out the cone head and a couple other smaller details, or moved them around, which is resulting in randomizer results that are closer to what I find interesting and want to work with.
Trying to find an entry point	""	1	1	I started out trying to find a way in, not feeling super excited by the models the randomizer was giving, then started maximizing the depth of the limbs.
Used the randomizer to find a shape I liked	""	1	1	Today, I used the randomizer until I got a shape that I liked, and then pulled parts out until I liked the shape.
Problems with the tool/Child Codes	Description	Sources	References	Example
Assignment errors	Instance of describing problem with the tool	1	1	I'm noticing more and more that I think there are some errors happening with the assignment of certain modifiers; I need to look into that a little more closely

				and play with it. There's some modifiers that don't seem to be there or working as expected, which is unfortunate.
Drag functions	""	1	2	Some of the drag functions still work backwards at times; I know why that is with some of them, others it seems like a glitch.
Groin	""	1	5	That's actually a place where the genital area bothers me; working between the two meshes, you do get that weird exposed mesh feeling in that area, and I would like to change that.
Light modifications	""	1	1	some don't seem to respond well to really light modifications
Material color doesn't export	""	1	1	I played around with the material colour a bit and selected another one (sort of a powder pink), but since the colour doesn't come through in the program when they're exported and opened, I have been leaving this step out since I'll do it again and with more sophistication in the general tool.
Randomizer tends toward unwanted mod	""	1	2	I think the system tends toward that because it's an available modifier, but it isn't something I want to repeat over and over.
Save function	""	1	1	I also did something to do the in program save function, such that it doesn't accurately save the figure. It's interesting in that it gives me another variation on the same theme, but I also should try and fix it.
back' function	""	1	1	the 'back' function selectively doesn't work.

Sketching for the first time/Child Codes	Description	Sources	References	Example
Asymmetry references reality	Experience of using the tool for exploration	1	4	I think that the lack of symmetry was an aspect, actually, that made the figure feel more 'real'. My body isn't symmetrical visually, and I think that's true for most people; I think this was a big contribution toward the experience feeling less like modifying a 3D doll and more like a beginning prototype for a complex object.
Composition	""	1	1	In the end I think the hips balanced the rest of the body out compositionally, and with having made the one large hand and the other side having no hand, I liked it a lot.
Expressive play	""	1	11	Today I modelled for around 30 minutes. I wasn't going in wanting anything in particular, and I'm pretty tired at the moment from writing, so I was having trouble feeling inspired by the randomizer or anything else. I was fiddling around with the arms after settling on a figure, and made them huge and inverted them behind the figure's head. After that, I started expanding the body, making as maximally large as possible. I really enjoy being able to merge

				different parts of the mesh into one another, creating an amorphous, continuous shape which is human and often has a human face for sure, but also has a topography, a landscape of feeling and self and being. I feel taken away from the aesthetic that a lot of 3D figures end up having, where it's very sanitary, the most ideal human possible within a network of terrible control apparatuses.
Focusing on the body rather than parameters	""	1	7	I'm not focused on the wording or even the parameters so much; I feel more like I'm moving and feeling my way through working with the body, rather than focusing on what the particular parameters are.
Instant joy and satisfaction	""	1	3	I did it and immediately knew that that model was complete, whereas before I'd felt ambivalent and like I wasn't sure how soon that particular figure would be done. Then, suddenly, one modification and it's complete. It really reminds me of a joy I don't often feel when using digital media, where it feels so easy to just tinker and tinker and adjust forever. I'm so used to that in physical, analog media; I reach a point where a piece feels finished, I usually can't tell when it's coming, but once it happens I know immediately that it's done. It's an irrevocable moving from one state to another. I really miss that when I'm working digitally, which I've done a lot of over the past six years. It's so satisfying and for me drains tension out of my body. I instantly had that feeling.
Making figures that trigger questions	""	1	6	I've been thinking about what one of the workshop participants said about being in the "borderlands of gender identity", how fixed certain characteristics are in so many people's minds in terms of being gendered one way or another, and how to play with that, even in terms of my own perception. What is defining how I am gendering the figures I'm creating here? How? Why? Does that change which results from the randomizer that I choose to work with? I think it does; I'm still making figures that I identify with in certain ways, and gender is one of those, but I'm interested in how that comes up. Something to think about.
Meeting my own needs	""	1	4	I used the tool for about 45 minutes today. It was interesting. Something I've been thinking about and have discussed with Sarah and Rebecca is how I set out to make something usable for novice users, but by the time I was starting that, I was no longer a novice user. I knew how to use 3D modelling software to do what I wanted, and was essentially trying to design backwards to a previous state of my art practice/being. But I'm not capable of doing that necessarily and my needs changed! I didn't need something to make up for or to use instead of 3D skills; I needed something to suggest ideas and to get me out of ruts in terms of how I'm thinking about the body and how to use it and form it

				in my work.
Simplifying the process	""	1	3	Changing it will just be a matter of moving that part of the mesh backward in Blender/Cinema 4D though, whereas before I would have had to resize everything individually in the genital region.
Truly sketching	""	1	12	This feels really new and fresh and inspiring, and that's a nice way to feel about making art, on a day to day level. It's great to feel art as a bright spot and a reprieve, a break from everything else going on and a source of possibilities in a moment of life transition.
Using media for sketching potential	""	1	3	I get to make something cool with that feeling and feel at least emotionally unburdened. It's expressive and pretty instrumental in my mental health being better. I've been trying to find a way to do something like this with bodily forms for a long time, but I was so precious about it that it was hard to snap out of that mindset.

The figure/Child Codes	Description	Sources	References	Example
Abstraction	Description of the figure or intention	1	13	I do really enjoy the way this effect makes the whole thing look somewhere between couture and body armor, protected, structured, organic, floral. The other, I made the penis very wide early on, which I enjoyed expressively (making a phallic object non-phallic), and played with other aspects of the body, including adding a belly and making the lips wider and the eyes more open. I also stretched the fingers out to match the belly. Then I made the face butterfly shaped by exaggerating the face shape, which gave the whole thing and overall effect of stretching toward the front of the body, floating forward. The movement of the body feels both organic and involuntary, an uncanny valley ooze with some animal and human and neither features.
Allowing underrepresented characteristics to come through	""	1	8	I also felt, though, that the system allowed certain characteristics to come through much more than MakeHuman ever did (fatness, squashed faces, weird nose shapes, rolls here) and I appreciated the lack of symmetry that I built in to the system.
Focusing on feeling	""	1	6	Rather I'm looking at the aesthetic qualities of various parts of the body and feeling them through, thinking about what they communicate emotionally, how they make me feel and how they might make others feel.
Intentionality of appearance	""	1	10	I also pulled both the back of the head and the back out, and I liked the way those two dovetailed together. I moved some other parts of the body around too.

Looks like people I know	""	1	6	I see parts of other peoples' bodies and of my own in modelling figures using this tool, and I also see my own emotional expression more clearly.
Not focusing on the whole body	""	1	11	I apply a modifier if I want to and if I like the way it looks, but I'm not focused on the label per se or necessarily always on the "whole" body.
Not too perfect or precious	""	1	10	Even though the model and I are different shapes, it made me think of my own body and how different parts of my body are approximately that symmetrical. Similar, but not the same, and really variable and imperfect.
Tool not interested	""	1	2	I also made the legs a bit rounder and sort of tried to make them more symmetrical, but enjoyed how much these two weren't interested in that and how complementary they ended up being; both similar and different.
Undesired characteristics	""	1	8	I then went about making it less of a conehead shape;

APPENDIX J ETHICAL APPROVAL INFORMATION

Re: Consent form for approval

Christophe Rhodes <C.Rhodes@gold.ac.uk>

Fri 31/03/2017 14:06

To: Kiona Niehaus <knieh001@gold.ac.uk>

Cc: Rebecca Fiebrink <r.fiebrink@gold.ac.uk>

Hi Kiona,

This looks fine to me. I think formally this might need to be considered by the department's Research Ethics Committee; I'm not sure we actually have one of those. Perhaps the best next step would be to complete the College's research ethics form

<<http://www.gold.ac.uk/media/documents-by-section/about-us/governance/ethical-approval-form.doc>>

(most of the answers will be "no" or "not applicable", I suspect) and have it approved by Mick as chair of the department's Research Committee? If time is of the essence, I think you can act as if such approval will be granted.

Best wishes,

Christophe

Kiona Niehaus <knieh001@gold.ac.uk> writes:

> Hello Christophe,

>

> I hope you're well.

>

> Please find an information and consent form for a short series of

> individual interviews (6-10 interviewees total) with arts

> practitioners. Rebecca has looked it over and is happy with it, but

> requested we run it by you for your approval ASAP.

>

> Thank you!

>

> Best wishes,

>

> Kiona H Niehaus

>

>

>

>

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Senior Lecturer, Department of Computing, Goldsmiths,
University of London, New Cross, London SE14 6NW. +44 20 7919 7851

Re: Ethics forms

Mick Grierson <M.Grierson@gold.ac.uk>

Fri 31/03/2017 21:46

To: Kiona Niehaus <knieh001@gold.ac.uk>

Cc: Rebecca Fiebrink <r.fiebrink@gold.ac.uk>

Hi Kiona

This looks appropriate- and the format is good.

Happy for you to proceed.

Best

Mick

On 31 Mar 2017, at 20:20, Kiona Niehaus <knieh001@gold.ac.uk> wrote:

Hi Mick,

I hope you're well.

I sent the attached consent form for a series of interviews with arts practitioners (6-10 total) to Christophe for ethics review today at Rebecca's prompting. Christophe is happy with it, but he requested that I fill out the attached ethics form and run it by you for approval as chair of the Research Committee. Please let us know if you have any questions or corrections.

Best wishes,

Kiona H Niehaus

<ethical_approval_arts_int_khn17.doc>

<KHN_consent_art_interview_17.docx>

INFORMED CONSENT FOR ARTS PRACTITIONER INTERVIEWEES

Researchers: Kiona Niehaus, with the supervision of Dr Rebecca Fiebrink (Department of Computing, Goldsmiths, University of London)

Project: Arts Practitioner Interviews: Creative Materials Interaction

You are being invited to take part in a research interview. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what the interview will involve. Please ask the researcher if you have any questions about what the information means. You can take time to reflect on whether you want to participate or not.

The purpose of this research is to develop better software for making customizable, diverse and creative 3D modeled human avatars. As a component of this research, this interview specifically looks at the interactions you perform when working with your material(s) of choice in your art practice, and at the language you use to describe these interactions. These interviews will be used to inform the design of innovative techniques to allow amateur users more creative control when designing human avatars for use in games, art, and other projects.

If you choose to participate in this interview, you will be asked a series of short questions about your creative process, with specific focus on your interaction with materials when creating artwork. You will then be asked to engage in approximately 15 minutes of modification of materials and/or a work in progress, with opportunity afterward to follow up with any further comments you may have. The total interview time will be approximately 25-30 minutes. You may ask questions at any time.

'Modification of materials' in this context may refer to physical manipulation of traditional fine art materials like clay, paint, etc., found objects, and the body, as well as digital manipulation of files in software programs such as Final Cut, Maya, and Photoshop. The materials used in this portion should be similar to those you normally use in your creative practice. The modification portion should move at your own pace, and may be completed in more or less time depending on your comfort. The purpose of this exercise is to explore the language you use to describe actions in real time, with a visual/physical reference for the modifications you are performing for you and the researcher.

Your responses may be used, either quoted word for word or summarized, in academic papers and presentations. Your responses will be credited to you/your pseudonym, unless you request otherwise. The interview will be video recorded, and this documentation may also be used in research publications and presentations. If you would feel more comfortable having the camera directed away from your face, or if you require other specific accommodations in order to be recorded, please address these concerns with the researcher prior to beginning the interview session. The interviewer may also take notes during the interview, and you will be given the opportunity to review these notes at the end of the interview.

Your participation is voluntary, and you are free to withdraw at any time without needing to give a reason for doing so.

If you have questions or concerns about any aspect of the above information, please contact Kiona Niehaus at knieh001@gold.ac.uk, or Dr Fiebrink at r.fiebrink@gold.ac.uk

Research Ethics & Integrity Sub-Committee

Approval Status: Approved

To: **Ms Kiona Neuhaus, Computing**

From: Professor Simon McVeigh, Chair

cc: Karen Rumsey

Date: 16 March, 2017

Ref: EA **1328**

We are pleased to inform you that the Research Ethics & Integrity Sub-Committee has approved your project:
Utility and usability of new approaches to modelling 3D human avatars for diverse and creative applications.

Approved ethical applications are available in the Research Office for other researchers in the college who are applying for grants; they may also be sent out as email attachments if requested. This is to help applicants. Please let Karen Rumsey know within two weeks of this letter if you would rather not have your ethical application form available in this way.

Best wishes for your project,



Professor Simon McVeigh
Chair, Research Ethics & Integrity Sub-Committee

Kiona Hagen Niehaus

Project: Utility and Usability of New Approaches to Modeling 3D Human Avatars for Diverse and Creative Applications

November 2019 amendments to April 2017 ethics board approval, for a series of small workshop studies in January 2020:

This research study will no longer be undertaken with the in-person supervision of Dr Rebecca Fiebrink, since she is on leave until April 2020. Drs Sarah Wiseman and Marco Gillies will fulfill her previously stated role in this instance.

7. State the variables to be studied, topics to be investigated, procedures to be used and/or the measurements to be made. (Please attach a separate sheet if necessary)

Procedures Used:

Workshops at Goldsmiths:

The format of these workshops will be 3–4 workshops, 3–4 hours in length, in which the participants will be prompted to come up with an individual idea for an avatar design, then execute that idea using the previously-described software tool (video, audio, and screen recorded). The exercise will be repeated, with a break in between the two exercises. Once the second exercise has concluded, participants will be asked to fill out a short survey, and to participate in a group interview (video and audio recorded).

Studies at home:

This part of the study will now be optional and voluntary. Participants will not be asked to keep diaries or any specific record of their use of the software, and their continued use of the software tool is at their discretion. We will circulate a digital survey 2–4 weeks after the initial workshop, in order to gather data about whether participants have continued using the software tool, and, in this case, what their experiences with the software have been since completing the workshop.

8. Specify the number of and type of participant(s) likely to be involved.

The number of participants has been updated to 9–12 (total across 3–4 workshops), with an additional 3–4 participants as a pilot group (12–16 total). The description of participants otherwise remains the same.

9. State the likely duration of the project and where it will be undertaken.

January–February 2020.

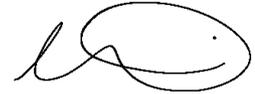
12. State how the participant(s) will be recruited. (Please attach copies of any recruiting materials if used).

The participants will be recruited online and at Goldsmiths through the aforementioned channels. Participants will fill out a pre-screening survey, which will be used to select a

variety of participants based on our demographic interests (artistic proficiency , experience, and media used, experience with avatars and character creation systems in other venues, gender/racial/other demographic diversity) (attached).

13. State if the participant(s) will be paid, and if so, provide details and state reasons for payment.

Pending an approved application for funding (Computing Department Research Fund, 26th November 2019 meeting), we hope to be able to pay participants £10 per hour for their contribution to this study. This payment is in recognition of their creative expertise and intellectual and time-based contribution to this research project. It will be made to clear to participants that their compensation is not dependent on completion of the full workshop.



Helen Pritchard 12/11/19

INFORMED CONSENT FOR PARTICIPANTS IN 3D HUMAN AVATAR USABILITY DESIGN STUDY

Researchers: Kiona Niehaus, with the supervision of Dr Sarah Wiseman and Dr Marco Gillies

Project: Utility and Usability of New Approaches to Modeling 3D Human Avatars for Diverse and Creative Applications

You are being invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please ask the researcher if you have any questions about what the information means. You can take time to reflect on whether you want to participate or not.

The purpose of this research is to develop better software for making customizable, diverse and creative 3D modeled human avatars. This study specifically looks at the kind of interactions the user is able to perform in order to manipulate various aspects of the avatar on-screen, and measures these affordances according to their efficacy, ease and speed of use, and the ultimate creative output the user is able to achieve, according to their own evaluation.

The researchers will observe participants during their interaction with the software tool. We will take notes, in addition to visual documentation (video and/or photo) of observations. All participants will be asked for consent before being photographed or recorded, and this material will not be used without explicit participant consent, including in academic publications. Any work you produce in the course of these sessions may be used in academic publications and presentations, and will be credited to you/your pseudonym, unless you request otherwise. Participants will be able to ask questions at any time.

Please be aware that this software involves realistic, non-sexual nudity, and that this may be uncomfortable for some participants. Participants are responsible for treating one another with respect, and anyone who fails to do so may be asked to leave.

If you choose to participate, you will be asked to come up with a concept for the design of a 3D human figure/character. You will be given a software environment in which to drag and manipulate various aspects of a nude 3D digital avatar, in order to execute your concept. You may be asked to describe your interactions and process to a researcher as you use the software. This exercise will then be repeated, with a break in between the two sessions. You will be asked to fill out a short survey, and to participate in a group interview where you will be asked to describe your experience of using the software. This workshop will last between three and four hours. While you are free to take breaks at any time, this format will include one 20 minute and one 10 minute break.

Participants will have the option to continue to use the software after the workshop, and will be contacted by email with a link to a digital survey within two to four weeks of completing the workshop, with the opportunity to give further feedback about the tool if they have continued using it. Continuing to use the software after the workshop, and completing this follow up

survey, are optional and voluntary, and choosing not to complete this aspect of the study will not impact your overall participation in this research or your compensation.

Your participation is voluntary, and you are free to withdraw at any time without needing to give a reason for doing so. Participants in this study will be paid £40.00 for their participation. Withdrawal during or after the workshop will not impact your payment as a participant.

If you have questions or concerns about any aspect of the above information, please contact Kiona Niehaus at knieh001@gold.ac.uk, or Dr Wiseman at s.wiseman@gold.ac.uk, or Dr Gillies at m.gillies@gold.ac.uk

CONSENT FORM

Full Title of Project: Utility and Usability of New Approaches to Modeling 3D Human Avatars for Diverse and Creative Applications

Names and contact addresses of the people carrying out the research:

Kiona Niehaus
 Department of Computing
 Goldsmiths, University of London
 New Cross, London SE14 6NW

Dr Sarah Wiseman, Dr Marco Gillies
 Department of Computing
 Goldsmiths, University of London
 New Cross, London, SE14 6NW

	Please initial box
1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	
3. I consent voluntarily to participate in this study.	

Please tick box:	Yes	No
4. I agree to being video recorded during the study.		
5. I agree to the use of photos and video being used in research publications and presentations.		
I would like to be identified by a pseudonym (if yes, please provide):		
6. I would like any creative work produced in this study to be credited to me by name/pseudonym.		

 Print name of Participant

 Date

 Signature of Participant

 Print name of Researcher

 Date

 Signature of Researcher

A copy of the Informed Consent Form has been provided to the participant ____ (initialed by researcher)

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