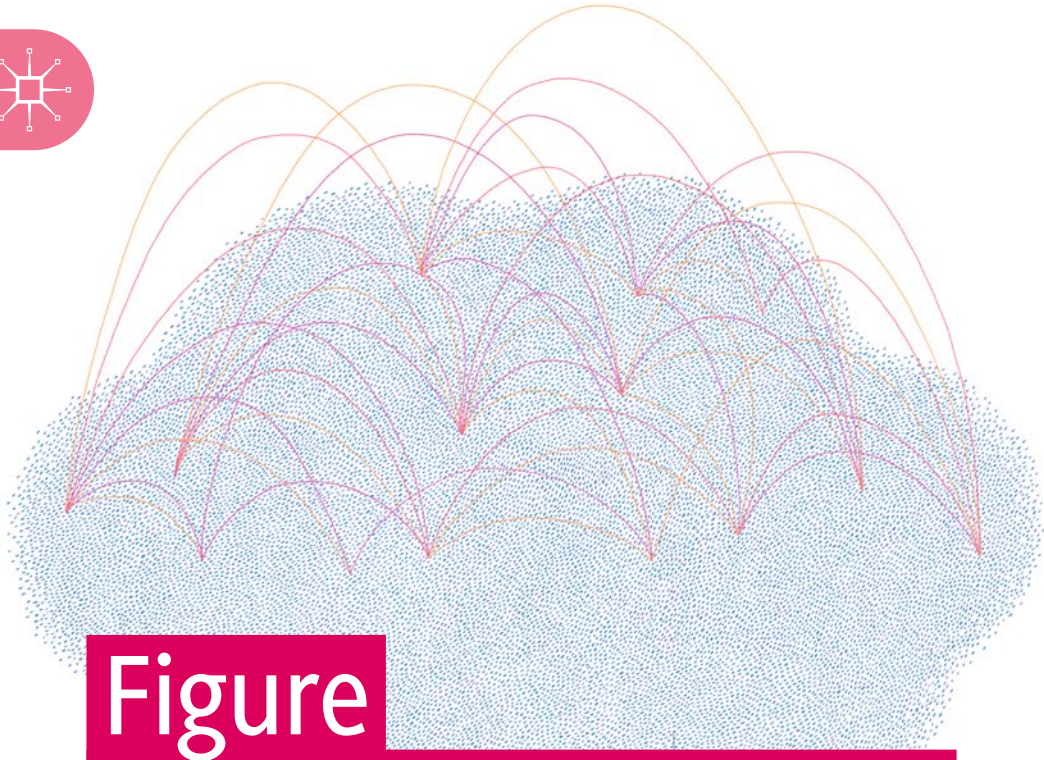
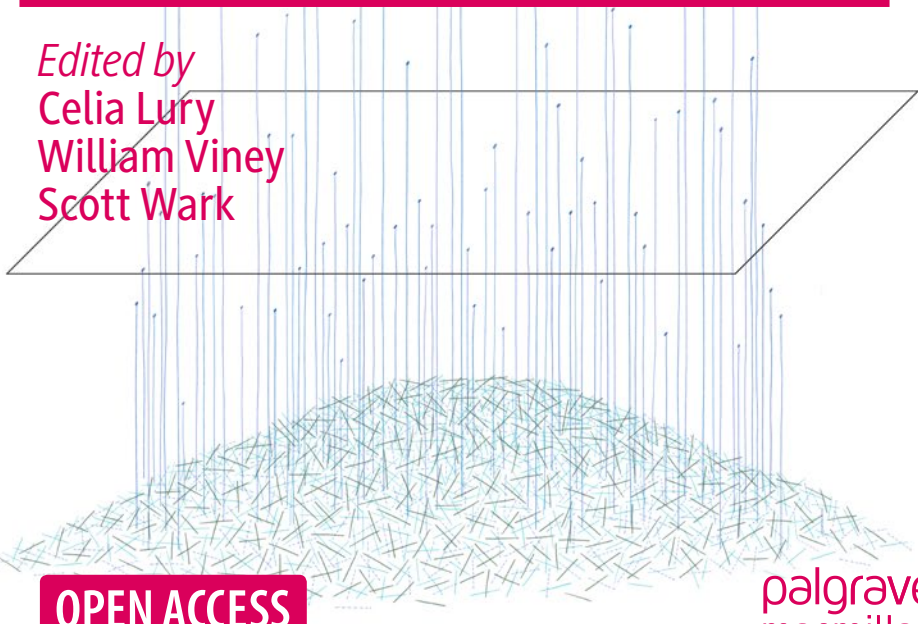


Figure
Concept and Method

Edited by
Celia Lury
William Viney
Scott Wark



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Preface

Knights of the Oblong Table

—Di Sherlock

When I call them
Knights of The Round Table
it's a spur to the collective wit.
The nomenclature derided,
others are proffered, dismissed,
until, all things considered,
someone comes up with
Knights of The Oblong Table.
There we have it.

The confederacy shifts
dune-like,
presence, absence
configure, reconfigure
in the uncertain wind.
The Table a stout ship,
the Crew vociferous –
riffing, roaring,
cursing, complaining,
joking, jibing,
expleting, explaining,
sparing, sparring,
fooling, finagling,
loquacious, voracious,
complicit, explicit,
hopeful, doubtful,
always
respectful
always
remembrance.

No captains
stowaways
hostages
tourists.

Passengers
by invitation only.

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This volume was collated from presentations given at a conference called *Figurations: Persons In/Out of Data*, which was organised under the auspices of the 'People Like You' project and held at Goldsmiths, University of London, December 16—17, 2019. We would like to thank our keynote speakers, Wendy H. K. Chun, Jane Elliott, John Frow, and AbdouMaliq Simone, all of our presenters, and everyone who attended the conference and participated in discussions. In particular, we would like to thank our conference assistants, Avery Delaney, Stephanie Guirand, Ming-Te Peng, and Saba Zavarei, for their hard work, and Lizzie Malcolm and Daniel Powers from Rectangle for designing our conference poster and booklet.

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List of Figures

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Introduction: Figure, Figuring and Configuration

Celia Lury, William Viney, and Scott Wark

Introduction

The word "figure" refers to many things: numbers, characters in texts, representations of persons or other entities in images; turns of phrase; abstractions and personifications; movement or series of movements; a diagram or a short succession of notes. Alongside these many everyday uses, the figure has a long history as a concept, migrating across disciplines and fields of research, including literary and historical studies, art criticism and history, philosophy, politics, feminism, science and technology studies, information and computer science, mathematics, design, sociology and anthropology. We do not discuss all these understandings

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here, but consider a few that have been influential and are relevant to the contributions in this collection.

We aim to address how figures, figuring and configuration provide a way to study complex, contemporary problems and processes that require interdisciplinary approaches. We outline how individual contributions make use of figures, figuring and configuration. We demonstrate what is at stake in the analysis of figures, the practice of figuring, and the compositions of configuration.

Part 1: Figure

In his essay "Figura" (1938/1959), Erich Auerbach shows why beginnings and ends often meet in figures. The Latin word *figura*, from which the English word follows, came into Latin via technical Greek discourses on *morphē* and *eidos*, *schēma*, *typos* and *plasis*—a constellation of words that plays with the subtle differences between form and plastic shape, statue and portrait. By late antiquity, Auerbach argues, a tension emerged within *figura*, which retained both its material (concrete) and immaterial (abstract) significance. The classical meaning given to *figura* encompassed forms, shadows and speculative appearances, which tied it to a vestigial materialism (Porter 2017). For Auerbach, these philological tensions between the material and symbolic became fundamental to how pagan figures entered Christian doctrine and devotional practice.

Long into the medieval period, *figura* signified ways of knowing that connected signs to material and historical life. The Old Testament "prefigures" the New Testament, past and future are symbiotically shaped in, and indeed incarnated by, typology: Word made flesh. What Auerbach calls "figural representations" go beyond the work of allegory or metaphor, however. Figural representations involve an economy of prediction and fulfilment, an event or person signifying both itself and a second that it involves or fulfils, with each retrospective analysis serving as an opportunity to read the present in a past, while each event or type of the past has the potential to join a phenomenon in the future. Such a time is lived conditionally and *in potentia*, inhabiting what Giorgio Agamben names the "already-and-not-yet" of the figured future and the adopted past (2000: 74, 138–45).

Auerbach's figural representations are adaptive signs, the work ascribed to them is multiple and their referential capacity varies according to different traditions of practice and innovation. For Auerbach, figures intervene in and transform the referent: each figure (p)refigures, making room for the work of figuration and subsequent configuration and linking practice, including the practice of analysis, with expressions of potential. Every figure thus implies a serial creativity in that it contains "sign qualities, denoting an object, and thing qualities, which rather confect a 'figure' to be contemplated" (Tygstrup 2021: 238).

Edward Said characterises this feature as an "essentially Christian doctrine for believers but also a crucial element of human intellectual power and will" (2013: xxii). It is this "but also" that has allowed Auerbach's analysis to branch from the semantic meaning of the word "figure" into an analysis of a world, what he calls a "historical situation" (1938/1959: 97), while also enabling figures to continue to be taken to be exemplary forms of humanistic reason. Historian Hayden White writes that it is this tendency to mix concept and method that allowed figuralism to underpin "Western culture's unique achievement of identifying reality as history" (1999: 96). As we shall see, other and alternative understandings of figures and configuration have emerged to both support and undermine this sense of humanistic achievement and its proprietary enclosure of "culture," "reality" and "history" by Western forms of thought.

Although Auerbach did not intend his methods to be either sociological or political,[1] thinking with figures has accompanied a variety of approaches in the social sciences, the humanities and political practice. For example, Georg Simmel's sociology used the figures of the stranger, the poor and the adventurer to illustrate a more general condition, whereby "each person is called to realize his own, his very own prototype" (1971: 557). Norbert Elias developed a sociology in which great significance is attached to process and the interdependence of persons. For Elias, it is the social scientist's role to understand "the changing configuration of all that binds them to each other" (2007/1987: 79). Figurational

[1] Replying to critics of *Mimesis*, Auerbach felt others had "ascribed to the book, in praise or blame, tendencies that were far removed from me: that the method of the book is sociological, even that the tendency was socialist" (2013: 570).

sociology produces an understanding of persons as relational, provisional, performed and in-process. It aims to show how figures articulate intermingled processes operating beyond the scale of singular or unitary entities such as the individual or society, towards their dynamic and continuous figuration.

Figuration offers other thinkers a creative means of blending and transitioning between units, scales, orders or magnitudes of time and space. For example, figures are central to the work of Walter Benjamin, who used them to arrest world-historical processes of modernisation. His dialectical treatment of Charles Baudelaire's poetry of a new urban modernity is representative. Baudelaire is often remembered for celebrating the figure of the *flâneur*, the disinterested urban aesthete and observer. For Benjamin, it is with the *flâneur*'s emergent and collective opposite, the crowd, that the true "sensation of modernity" becomes apparent. In the figure of the crowd, Benjamin argues, one can experience "the disentegration of the aura" (2003: 339), the uniqueness of things in the world, in what he calls "immediate shock experience" (2003: 343). Handled dialectically, figures like these—others include the storyteller, the angel and the collector—offer Benjamin a means of specifying what is both new and significant about modernity rather than what is simply novel.

Importantly, however, many scholars have been suspicious of the power invested in figures and critical of the historical, political, racial and technological presumptions and prejudices of those that speak for them (see Dawney, this volume). The arbitrarily coherent—and white and male—canon detailed above is continuous with declarations that the use of figural representation is "Western culture's unique achievement of identifying reality as history" (White 1999: 96). Some have pointed out that figuring involves both inclusion and exclusion; for example, the figure of "man" figures who gets to be considered *human* by means of a series of constitutive exclusions (Mbembe 2017). Does one have to be male to count as "man"? White? Western? Wealthy? Able-bodied? For Alexander G. Weheliye, "racialisation" is crucial to this figure's constitutive exclusions: in his terms, it "figures as a master code within the genre of the human represented by western Man" (2014: 27). Weheliye argues that focusing on how this figure is constituted and who it excludes allows us to take "humanity" itself as an object of knowledge. This particular

figure can function as a "heuristic model" for reflecting on and critiquing how we produce knowledge about the world (2014: 8).

In offering us a means of connecting word to world, figures are doubled. They inform: that is, they participate in knowing, containing qualities that shape how knowing is known. But their tendency to eschew specification or determination also leads us to the very limit of expression and representation. Among philosophers such as Gilles Deleuze, Felix Guattari and Jean-François Lyotard, singular figures are illustrations to be contrasted to the *figural*, a disruptive force that is irreducible to systemic and linguistic approaches to representation and whose movement is a portal to pure sensation and becoming (Deleuze and Guattari 1994; Lyotard 2011). For Michel Serres, by contrast, "figures of thought" are quasi-algorithmic, providing mobile protocols or operations that turn thinking into a set of parameters to be performed on something (Watkins 2020: 22-3). Serres' figures are both natural phenomena and literary and mythological in process. Figures as various as a fox or the Challenger space craft, the Greek god Hermes or the movement of a rugby ball are equivalent in that they carry out and participate in the emergence of concepts. The very movement of figures makes them useful to think with.

Part 2: Figuring

Once you start hunting for figures, it's hard not to see them everywhere. They inform research into all manner of things, objects and processes across disciplines and modes of scholarly enquiry. A well-crafted figure can lend consistency to thought, drawing together its disparate threads; indeed, for Paul De Man, "figurality" is an essential component of philosophical speculation (1988: 13). What makes figures so compelling to think with is that the shape they lend to thought contains an imperative—to put thinking to work. To invoke or propose a figure *of* something, to figure *with* something or to declare that you or someone else should figure something *out* is to suggest, tacitly or not, that figures involve the work of figuring. The recourse to using figures to illustrate a conceptual claim or to specify what's really at stake in our research has methodological implications: it prompts us to

ask not only, with De Man, what thinking with figures does to our thinking, but how it shapes our methodological engagements with the objects of our thought.

Taken as a method, figuring has productively diverse connotations. It can involve giving shape to something or, alternatively, to apprehend the shape that something already has. It can mean to calculate, solve or discover something, as in to figure something *out*. Figuring can also mean to play a role *in* an event or happening. The expanded conception of figuring proposed in this collection encompasses each of these disparate processes.

Figure's most obvious (and original etymological) sense is spatial, but not in the sense of form imprinted into matter: the figure is shaped by and shapes its grounds. This distinction between a figure and what surrounds it is fundamental in disciplines that study visual objects, most notably art history, though it was also the subject of Edgar Rubin's psychological research into perception (1958) and further formalised by Gestalt psychologists. Though colloquially conceived of as opposed elements of an image or scene, Rubin's figure and ground are intimately related because the distinction between them is articulated by what he called their "contour," or shared border. Through experiments with images or objects containing components that reverse the relation between figure and ground, Rubin argued that figures that emerge from grounds exhibit something like a "shaping effect" (1958: 194-5). For W. J. T. Mitchell, the image that Rubin used to most arrestingly illustrate this effect—the eponymous "Rubin vase," which can be seen as a decorative vase on a dark background or two faces on a light background—reflects on its own conditions of emergence: it is what Mitchell calls a "metapicture" (2008: 9-10).

If figures are metapictures that draw attention to their conditions of emergence, they also inform our engagements with things and processes beholden with, through or by them. Diagrams do this in a particular way. For Charles Sanders Peirce, what defines diagrams is their capacity to depict both "a set of rationally related objects" *and* "the relations between" these objects (Peirce 1976: 316-7). By inscribing these relations, diagrams

render the objects of thought operable in new domains—such as when spatial relations re-present algebra, as, for example, in Cartesian co-ordinates (Krämer 2010).

In his philosophical discussion of the use of figures in mathematics, Gilles Châtelet suggests that diagrams provide us with a way of apprehending thought in the act. Figures "trac[e] contemplation" by materialising how problems are worked out (2000: 8). More generally, they capture the "gestures" that give thinking its texture or shape. These gestures might include tracing lines or plotting points, but they also include more complex or embodied manoeuvres, like cutting shapes out or articulating contexts—as when a figure of a circuit conveys the sense of an electromagnetic field's encompassing, spatial "around" and, along with it, "a new type of intuition linked with the domination of oppositions by loops and bends" (2000: 154). In this conception, figures aren't just representations or depictions, or a "subsidiary 'tool'" of mathematical reasoning. They have what Châtelet describes as an "ontological dignity" which makes certain kinds of mathematical operations possible before the theory behind them is fully understood (2000: 11). For Châtelet, it is not only that figures like diagrams operate or that they're one of thought's enabling "cultural techniques" (Krämer 2010: 2), but that, in figur*ing*, they make it possible to apprehend the production of knowledge. In this conception, figuring precedes and succeeds distinctions, ordering—after Rubin, we might say *contouring*—relations between figures and grounds.

It is by figuring air, for example, that what might otherwise be taken for granted can be acknowledged, allowing us to appreciate its place at "the foreground of our perception as both object and condition of perception" (Horn 2018: 23). The installation *Yellow Dust* instantiates this process and demonstrates how it works. By translating data about air quality into a mist that could be seen, felt, and stepped into and out of by participants, as Nerea Calvillo and Emma Garnett suggest, interventions like these allow those who engaged with them to "[a]ttend[] to corporeal processes of practising air" (2019: 344). As Châtelet might put it, this figure traces comprehension: figuring air figures air *and* how air can be thought.

Part 3: Configuration

The word "figure" can be conjugated with a variety of prefixes and suffixes: prefigure, configure, disfigure, the figural, the figurative and figuration. But these "fixes" do not secure the object or entity in place. In Claudia Castañeda's terms, figuration incorporates "a double force: constitutive effect and generative circulation" (2002: 3). And this double force is why figure and its "fixes" have acquired a special value in helping us to understand our contemporary situation. By speaking to the relations in and by which figures figure, figure and its "fixes" provide us with a means of understanding and analysing problems that emerge in and through complex relations: of configuring.

Configuring refers to a joining of diverse elements that is never final or closed, even as it is stabilised. In practices of system design, engineering and information systems processing, configuration is not the final arrangement of hardware and software components, but refers instead to a provisional implementation of organisational infrastructures across myriad and often incommensurate practices. Because of its emphasis on the activity or work of relating the elements of a figure in movement, configuration has found particular application in science and technology studies, which has developed it to encompass the reflexive delineation of the bounds and composition of an object of analysis. As Lucy Suchman says, configuration is "[a]t once action and effect" (2012: 49): it both holds things together and enables potential transformation. Configuration comprises a method through which things are made *and* a resource for their analysis and/or un/remaking, both "a mode of ordering things in relation to one another" and "the arrangement of elements in a particular combination that results" (Suchman 2012: 49). An arrangement may—in turn—become a mode of ordering. This "double force" is why configuration is particularly useful for analysing novel kinds of ordering associated with the rise of digital technologies, the more-than-human dynamics of ecological crisis and emergent socio-political formations.

D. N. Rodowick (2001) describes new media as technologies of the figural by drawing on Michel Foucault's notion of similitude: whereas "resemblance presupposes a primary reference that prescribes and

classes … the similar is unleashed in a temporal continuum without origin or finality … governed only by seriality, the similar multiplies vectors … that can be followed as easily in one direction as another, that obey no hierarchy, but propagate themselves from small differences among small differences" (Foucault 1983: 44). In enabling unprecedented control over strategies of ordering in time and space, he suggests, contemporary media expand the possibilities of figuration as similitude. Frederik Tygstrup describes the set of new objects-made-out-of-information as having a figural force:

> Intuitively, we would probably say that information is something predicated of discernible objects in the world. In the information society, however, the hierarchical relation between objects and information tends to get reversed. On the one hand, what seems to be information about an individual object increasingly stands out as the construction of a new, dividual object. And on the other, the aggregation of information about decoded, endlessly divided objects allows the recoding of completely new, transversal objects. (Tygstrup 2021: 237)

These objects have a "two-pronged expressive capacity, sometimes referring back to something existing and sometimes instantiating an image of something new" (Tygstrup 2021: 238; see also Cellard, 2022). Underpinning these transformations are technical platforms that, as Adrian Mackenzie (2018) argues, have an essentially configurative modality characterised by "configurative dynamism," "configurative differentiation" and "configurative growth." Ordered by the platform, digital media configure people and things in constantly varying and experimentally modulated relations.

Feminist science studies in general, and the work of Donna Haraway in particular, have engaged these possibilities of instantiating "something new" beyond (and before) the digital. *A Cyborg Manifesto* (1985) mobilises a politics of the figure that "rests on the construction of the consciousness, the imaginative apprehension, of oppression, and so of possibility" (1991: 149). Throughout her career, Haraway has presented various "material-semiotic nodes or knots in which diverse bodies and meanings co-shape one another" (2008: 4). These she calls "figures"

(sometimes "string figures"), but named differently according to the node or knot, the (con)figuration of different diverse bodies and meanings. Best known are the cyborg, oncomouse, Terrapolis, chthulu, which are "performative images that can be inhabited" (1997: 11; see also 2016). Their collective work serves to divert political energy from traditional figures of sociological, political and psychoanalytic thought—the mother, child, terrorist, immigrant, schizoid or hysteric—towards feminist figures that, for Rosi Braidotti, "materially embody stages of metamorphosis of a subject position towards all that the phallogocentric system does not want it to become" (Braidotti 2002: 13). Braidotti, Haraway and other feminist makers of figures and practitioners of figuration do not stand outside the world they describe. Figures are to be inhabited; they are historical entanglements to be felt, reckoned with, struggled over and occupied (see Braidotti 2006: 170; Bastian 2006: 1038).

This tradition of making creative, concrete, multiple and playful figures has inspired scholars that seek alternative ways of confronting complex relational configurations and, perhaps, imagining them otherwise. In their quest to "denaturalise humanist conceit" (Giraud et al. 2018: 64), for example, scholars in environmental humanities have taken up the challenge figures pose to normative separations between animate and inanimate, nature and culture, animal and human. The work of these scholars acknowledges that there are "dangers associated with particular figurations" (2018: 74). Yet it also finds a critical, even hopeful potential for alternate settlements between peoples and planet: if indeed "[w]e *are* certainly quite a crowd," then "the ways in which we meet as particular species, and how these entanglements mesh with non-anthropocentric thought, deserve still further figuration" (ibid.). In this work, figures become critical diagnostic as well as prognostic tools of speculation—images or personas that can be used to understand and contest the social, political and conceptual configurations that we have inherited.

Similarly, work by Elizabeth Povinelli (2016) and Michelle Murphy (2017) is explicitly driven by the need to compose figures equal to contemporary political configurations. Each draws on Foucault's four figures of biopower—the hysterical woman, the Malthusian couple, the perverse adult and the masturbating child. Povinelli uses figures to identify what she calls the "governing ghosts" of late liberalism: the Desert, the Animist

and the Virus (2016: 15). Murphy characterises emergent figures as the "*phantasmagrams* of economic life" whose spectres of non-life, haunting the social reproductive consequences of the calculations of Gross Domestic Product, converge in the figure of The Girl: "the felt and astral consequences of social science quantitative practices, such as algorithms, equations, measure, forecast, models, simulations, and cascading correlations" (2017: 24).

This work invites us to reflect on how we use figures in the humanities and social sciences—and how we might make them knowingly and with responsibility. As Murphy writes, the girl is a "generic figure," but she is assembled from a broad range of practices, including "quantification, speculation, and affect … 'figured out' from a variegated patchwork of social science correlation and wishful speculation, of linked probabilities painted pink with tropes of agency imported from liberal feminism for a North American audience" (2017: 120). Figures, figuring and configuration, as Murphy reminds us, are historical accretions that now no longer rely only on the philological movement from word to historical situation but upon varieties of method and media, prefiguring, configuring and disfiguring.

It is this variety of method and media that this collection at once comments on and participates in. Our contributors identify figures, figuring and configuration as a means to query positions, political commitments and know-how. The collection experiments in alternate ways of knowing and living, finding and wrestling with figures that are both symptomatic of and can be used in the diagnosis of the relations that constitute the contemporary situation. The figure's configurative double force is what makes it something that can be engaged with *and* used as concept, methodological prompt and heuristic point of departure for creative and analytical engagements with thorny problems and tangled relations. It is the (im)*mediacy* of the figure that we aim to capture in this volume.

Part 4: Go Figure!

The chapters in this volume are collected here to entice others to "go figure!"—to show something of what the figure and figuring can do. Each chapter considers figures in specific contexts and traces the effects of

figures according to different critical perspectives and standpoints: no single way of figuring is advanced here. Instead, we draw attention to the many ways in which figures work, with the hope that you will be encouraged to "go figure" for yourself.

The next chapter is by Leila Dawney, who suggests that figures can play a central role in cultural politics—that is, in contestations over power, values and worth that play out in and through the production of culture. Recognising that figures have sometimes occupied a marginal role in the disciplines concerned with studying these processes—like sociology, political science and cultural studies—her chapter draws on the work of Michel Foucault, Erich Auerbach and Donna Haraway to propose a synthetic concept of figures equal to their cultural-political significance. With Foucault, her figures are "technologies of power" that order politics and society. With Haraway and Rosi Braidotti, she argues that insofar as figures are "performative images that can be inhabited," they are necessarily unstable, "labile" and in need of "care." Because figures are never fixed, it's incumbent on us not only to study them but also to remain attentive to their political force.

Scott Wark engages in a dialogue with Haraway's understanding of figures as performative images to be inhabited to argue that figures such as "the cloud," "platforms" or "the stack" allow for the apprehension of what is incommensurable in contemporary media: the speed, the complexity and heterogeneity of scales—both large and small. Rather than as images, however, he suggests that they do so by engaging the potential for reflexivity within media, understood as both instruments that mediate perception and cognition and *milieu*—literally, middle places—or *environments*. In this capacity, he suggests, figures have a unique capacity to help us understand how we live with, through, and in media-technical systems.

The chapter that follows is an interview between the artist Felicity Allen and Celia Lury. They discuss Allen's practice of Dialogic Portraits and the film *Figure to Ground—a Site Losing its System* (2021), which was produced as part of Allen's residency for a research project (https://peoplelikeyou.ac.uk/). Her dialogic practice allows for an exploration of both relations between the painter and her subjects, and the relations between figure and ground. It creates a double or multiple space in which the

figure of a person emerges. As Allen says, "In painting one might make a representation which has a background and speak of figure to ground, but 'ground' is also the sizing treatment and base colour on the canvas, for the picture itself. In this sense the picture itself is the figure" (insert pg ref this volume).

The issue of how to understand media by re-purposing media is confronted by Liliana Bounegru, Melody Devries and Esther Weltevrede. Identifying the difficulties of studying the lived experience of participating in information flows, the authors propose the novel method of the research persona. Rather like an avatar, the research persona is designed to figure out how users experience personalised information flows, but it does so by enabling researchers to inhabit the position of fictional users on social media platforms such as Facebook. The authors show how the figure of a persona can be used to make visible how platforms configure Internet users through the use of digital, ethnographic and speculative methods.

For Matt Spencer, the field of "configuration management," or the task of configuring large and heterogeneous computational systems, provides a rich site for reflecting on the role that figures play in ordering our relations to technical systems. Spencer's chapter focuses on the emergence of "promise theory," a little-studied area of systems management that formalises the "intent" embedded within technical systems by their designers in the form of—tacit or explicit—"promises" that a system will act in a particular way. Spencer suggests that the development of this pragmatic technique for "configuring" systems is of significance for the study of computation, in particular, and for social scientists, in general, because it marks a moment in which our relationship to complex technical systems shifts. In it, he suggests, we find the emergence of a different kind of relational figure of technical systems: one that recognises that to recognise the "intent" of such systems is to realise that using them entails a form of cooperation rather than mastery. In the figure of "configuration management," then, we find not only an under-appreciated moment in systems management's recent history, but also an example of a pragmatic shift in how technical systems are figured that, perhaps, betokens a more realistic, open and cooperative means of conceiving how we live in and with technology.

Promise is also central to William Viney and Sophie Day's discussion of personalised medicine. In their chapter, they consider how a research study figured relapse of disease for patients treated for cancer and classified as being of high risk for metastatic recurrence. Focusing on the promise of personalised medicine through a multi-perspectival account of this study, they suggest that figures are used as an empirical proof in the research study they followed, while also forming promises in ways that are at once confirmatory and confounding. Drawing on the work of Auerbach, Viney and Day highlight the temporal dimension of the promise to show the ways in which the figuring of the disease in the research study encompasses multiple temporalities. Personalised blood monitoring of circulating tumour DNA uses novel genomic sequencing technologies but also follows an archaic analytic structure, insofar as it relies on serial figurations of something unresolved: a (yet to be defined) disease-in-progress.

Sophie Day, Jayne Smith and Helen Ward use a method of figuration to identify how different data and samples have been grown, cultivated, studied and propagated in a research hospital. Following Smith, a patient at the hospital and the titular "gardener" of their chapter, and "Grumpa," her tumour, enables the authors to track health data as it moves between the technical environments in which samples and data have been used. Their collaborative and investigatory work into how samples and data have been figured helps to identify the cross-cutting relations between care and research that are enabled—or disabled—by data's movement.

Jane Elliott also addresses how the figuring of time is integral to the realisation of the methodological potential of data. Discussing both self-tracking or personal informatics and methods of longitudinal research in social science in terms of how they figure the individual, she identifies the benefits of conceiving figure and ground in temporal terms, noting that while self-tracking practices rely on a cyclical and repetitive conception of time in order to observe, record and modify behaviour on a daily basis, longitudinal studies rely on a more linear conception of time. In her analyses of cohort studies, it is life events and key transitions that figure the individual against a taken-for-granted ground of everyday experience, whereas in self-tracking there is the potential for the individual to reflexively engage with their everyday lives. Elliott concludes with the

suggestion that "we therefore need to attend to more than the contrast between (or mutual constitution of) figure and ground, but their mutual constitution in cyclical and linear time" (191).

In their chapter about tracking and modelling air pollution, Emma Garnett and Srishti Bhatnagar also highlight the ways in which identifying a figure enables the relations between the objects and subjects of research to be problematised. Drawing on their ethnographic fieldwork as researchers in an interdisciplinary research project conducted in Delhi, the authors explore two occasions when the method of "person-centred environments" was troubled, revealing some of the underlying assumptions of disciplinary methodological and epistemological practices.

Celia Lury's chapter identifies and unpicks three figures of speech associated with contemporary political campaigns. These figures of speech, "Not in Our Name," #MeToo and #JeSuisCharlie, have been used by people to identify and associate with each other, but the figures themselves contain personal pronouns that are crucial components to how identification and association are achieved. The focus of Lury's concern is a personal pronoun—"our," "je," "me" and "you"—and the analysis centres on the shifting distribution of the collectives the pronouns call into existence. Lury suggests that the disjuncture between "participating in/being part of" produced by media-specific uses of pronouns raises issues of social and political inclusion and exclusion, as well as challenging ideas of truth and individual identity. Accordingly, the chapter indicates how the multiply mediated, pronominal iteration of figures of speech expose both the limits and the possibilities of a non-representational politics.

John Frow is specifically concerned with the pronoun "you" that is characteristic of the personalising address of the Internet; as he says, "the pronoun 'you' is silently embedded in an imperative that works ambiguously as both an order and an invitation" (252). He argues that uncertainty of deictic reference is at the heart of the interpellation effect, captured in Althusser's discussion of a policeman calling out "Hey, you there" (Althusser 2001). Frow describes the significance of the ways in which while digital or algorithmic personalisation generate a "you" that is not based on fixed markers of identity, these imaginary figures are constantly being "contextually specified through acts of rigid designation that seek to tie them to a name and a legally established identity" (255).

These *points de capiton* pin the digital self to administrative and legal documents that comprise an individual's official identity. But rather than seeing the relation between real and algorithmic personhood as dichotomous, Frow supports instead the idea that there has been a fundamental change at the level of ontology, since "interaction with data, whether voluntary or involuntary, witting or unwitting, is integral to the actuality of our selfhood" (257-258). Proposing that figuring means both calculating and performing the form of the person, he concludes that no single form provides a ground.

Rather than the "you" of personalisation, AbdouMaliq Simone asks us to consider as figures those who are "something else besides," or rather, to think of figuring as "involving accompaniment or as always also accompaniment: something that does not discernibly alter the visual and sensual dimensions of an event or entity, that remains apparently aloof from its configuration, but which nevertheless prompts a reorientation of view and engagement; which at least raises a degree of uncertainty about what it is we are confronting in an appearance that otherwise has all the hallmarks of an integrity and coherence" (265). Figuring as accompaniment does not create an obligation or a debt; it does not even require mutual recognition or desire. Instead, Simone suggests, it is an enactment of agency not bifurcated by self and other, human and nonhuman, but an intersecting of multiple operations. It is "the restitution of spaciousness" (p. 282, this volume).

Coda

The contributions we have just described draw on a variety of approaches to the concept of the figure, extending beyond those we outline in the first half of this chapter. Many deploy the concept of the figure to consider contemporary forms of the person and relations of personhood. In these contributions, a person is sometimes distinguished from the individual: as the figure of a child with asthma (Bhatnagar and Garnett), as a singular and plural figure of speech (Lury), as data extracted from a self that moves between walled gardens (Day, Smith and Ward) or as data that accompanies or is integrated in a self (Frow). Other contributions

(Bounegru, Devries and Weltevrede; Viney and Day; Allen and Lury) share an interest in figuring as a research or artistic method, working across disciplines with numbers, narrative, diagrams and images, highlighting recursion, dialogue and the putting into time of figures of thought. In some chapters, the individual is recognised to be constituted as a specific kind of person, distinguished as such in time in relation to a ground (Elliott). Others still (Wark, Spencer, Simone) address issues of figure and ground, of figuration and configuration, of what it means to inhabit a milieu, a surround or surroundings. In doing so, they enable the worlds built into figures such as "the cloud" to be acknowledged; they offer the promise of a restitution of time and space.

What all the contributions share is recognition of a doubling that is intrinsic to figure. Both noun and verb, a figure is always figuring, sometimes as part of a configuration. So a figure may indeed be a number, a character in a text, a representation of a person or another entity, as well as a knot and a node, a turn of phrase, a movement, a diagram or a sequence of notes. But to describe each of these things as a figure is to indicate that it is both the end-point and the beginning of a figur*ing*, an activation of the multiple temporalities of the (historical and future-oriented) present tense (Lury 2019). In the relations between subjects (who or what is doing the figuring) and objects (who or what is being figured), that is, in the (im)mediacy of the relations between doing and being, are the cultural, political and methodological possibilities of figuring: a figure and its configurations.

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2

The Work That Figures Do

Leila Dawney

Introduction

In Margaret Atwood's near-future science fiction novel *The Testaments*, the sequel to *The Handmaid's Tale*, the figure of Baby Nicole props up two opposing political regimes. "'So useful, Baby Nicole,' Aunt Lydia observes. 'She whips up the faithful, she inspires hatred against our enemies, she bears witness to the possibility of betrayal within Gilead and to the deviousness and cunning of the Handmaids, who can never be trusted'" (Atwood 2019: 33). Smuggled across the border from the misogynist theocracy of Gilead to Canada by her Handmaid mother fifteen years ago, she stands there for the success of the refugee programme from Gilead and the liberation it offers Gilead's women. In Gilead, on the other hand, she signifies the evils of Canada and the potential enemy within of traitorous Handmaids. Her image, still a baby fifteen years

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later, adorns the walls of the training centre for novice Aunts—the women who uphold Gilead's regime—where she is prayed for daily. In Canada, her face is held aloft on the placards held by refugees from Gilead and their supporters.

Figures, as "performative images that can be inhabited" (Haraway and Randolf 1997: 11), are central to the workings of cultural politics. They are technologies of power that work through the affects: offering spaces for inhabitation and emerging subject positions, stirring up intensities, and fostering attachments and hostilities. In a context where affect and emotion are powerful agents, figures give imaginative and material form to structures of feeling and political formations. Figures mediate power and authority and personify mythologies, generating cultural and political forms of life. The power of the figure of Baby Nicole to harness affects comes from her ability to refer outside of herself: to signify life, innocence, futurity, vulnerability and disloyalty, paradoxically in support of two opposing regimes. Whether individualised, like Baby Nicole, or "types," like the expert, the whistleblower and the migrant, they are at once social imaginary, media image, archetypal form and locus for public feelings.

Where institutional modes of authority such as the church, state and academy are increasingly questioned and public trust in these institutions declines, figures that challenge these traditional institutions can become new loci for authority around which public affects circulate. In the public sphere, figures such as Jordan Peterson and Greta Thunberg gain authority through their personification of inchoate political and collective feelings, and abject figures like the terrorist, or the benefits cheat, participate in regimes of control, uncertainty and paranoia. They gain traction through reference to master narratives and cultural myths, generating new mythologies in the process. Similarly, figures that were historically a focal point for collective politics, such as the heroic male worker, are losing their grip in an increasingly precarious and fragmented economy.

While the affective power of public figures is increasingly recognised in critical scholarship, little attention has been paid to their theorisation. There is a need for conceptual attention and precision to understand, firstly, how figures operate as affective technologies of power by tapping into public feelings, and secondly, their potential to organise alternative forms of life. This chapter sets a conceptual agenda for exploring the political work that figures do in contemporary cultural politics.

Understanding this work is, I argue, a vital aspect of the study of political life: the power of figures to shape public moods demands their urgent theorisation and critical attention, while attending to this power highlights their potential to guide other subjectivities and allegiances. This agenda is based on three initial premises. Firstly, figures are material-semiotic signposts towards ways of knowing, understanding and inhabiting the world. This means that they carry with them, and point to, sets of ideas, feelings and positions: they shortcut to what Raymond Williams calls "structures of feeling" (Williams 1977). They structure the world by giving substance to cultural ways of being in the world. Secondly, they are technologies of power that work through affective capacities of specifically historied bodies. In other words, they act on our bodies, generating emotional and affective responses and feelings and as such can be mobilised for particular political ends. The bodies that they act upon are already entrained to respond in particular ways: they are gendered, classed, racialised, and embedded in histories and cultures. They buy into certain life narratives, hopes and dreams, and it is in figures' interaction with already-entrained bodies that their affective work is undertaken. Finally, as a critical practice, figuration involves both invoking and thinking with figures. If we accept the first and second premises, and acknowledge that figures do indeed wield cultural power and that this power works on our affects, sensibilities and emotions, then, as critical scholars, we too can work with figures to bring about change, to question and to amplify other ways of being and living.

This chapter brings three writers whose work engages with the politics of figures and figuration into dialogue to provide a conceptual outline for thinking about the work that figures do. In different but overlapping ways, these three writers exemplify and develop understandings of figures that acknowledge and attempt to explain their cultural power. They demonstrate the importance of meaning making, storytelling and figuration in the shaping of social life; moreover, they begin the work of showing both how this takes place and its implications for understanding the relationship between power, bodies and our imaginary worlds.

The chapter begins with an outline of the concept of figuration in the German literary critic Eric Auerbach's *Mimesis: The Representation of Reality in Western Literature*, focusing on the power of figures to make stories and narratives "make sense" through their teleological and

portentous capacities. It then discusses how figures are understood in Michel Foucault's four figures of biopolitics in the *History of Sexuality 1.* In this volume, Foucault demonstrates the part figures play in securing regimes of governance; how they illustrate and exemplify what is counted as "normal" in a particular historical condition. Finally, this chapter discusses how the work of both of these thinkers plays out and emerges as critical practice through the philosopher of science Donna Haraway's "menagerie" of figurations. By reading the work of these three thinkers diffractively—against and through each other—and witnessing what arises from their interaction, I highlight how each develops conceptual tools for thinking about the relationship between figures and the political making of the world. In Auerbach, we see how figures become attached to myths of redemption, which confirm and reify cultural narratives. In Foucault, we see the emergence of figures as object-targets of biopower, demonstrating how they act as technologies (techniques) that work in the service of particular formations of power. Haraway uses both of these aspects of figural critique to intervene in the world, drawing a series of alternative, feminist figurations that challenge dominant narratives that define the human. Reading these texts together builds an agenda for studying how figures work as technologies of affective power and explores the potential for figures to destabilise normative ideas. This chapter proceeds by looking at how figures have been put to work to dismantle the very symbolic and structural orders that they suture, and it explores the relationship between figuration and affect. Finally, it discusses the cultural and temporal specificity of figurations, pointing to their need to resonate with and reflect existing cultural forms and material practices, and their vulnerability to being seized, or appropriated, like Baby Nicole, for other agendas.

Auerbach: Figuration as Tropic Device

The early twentieth-century literary historian and critic Eric Auerbach provides an important and seminal resource for thinking about the work that figures do. In his magnum opus, *Mimesis: The Representation of Reality in Western Literature*, Auerbach ties the practice of figuration to

the history of Western literature and representation. His work falls within a German humanistic tradition of literary criticism that understands literature as an expression of lived experience, and as such positions criticism as a dialogue between author and critic: an attempt to live the author's reality and experience the *geist* of the work. In *Mimesis*, Auerbach discusses how the term *figura* was taken up by the early Christians, notably Augustus, to describe the practice of reading the Old Testament in relation to the New. Unlike allegory, which points outside of itself to an abstract form, *figura* remains within the realist tradition, referring instead to other forms, or echoes, of itself. In the hands of the early Christian Church, and in Medieval Christianity, the New Testament becomes a "figural, and he adds, carnal (hence incarnate, real, worldly) realisation or interpretation of the Old Testament," enabling the Old Testament to be read as a precursor of what is to come and tying both together in an overarching salvation narrative of Fall, Sacrifice and Last Judgement (Auerbach and Said 2013: xxi). In late antiquity, the Old Testament's role became figurative: as a prophetic announcement or anticipation of the coming of Jesus. Auerbach illustrates this through Augustine, who maintains that the sacrifice of Isaac prefigures the sacrifice of Christ. Auerbach thus highlights the "vertical connection" of disparate elements of the Old Testament, enabling its reading as though "God chose and formed these men to the end of embodying his essence and will."[1] Here, the figure is central in constructing both ideas of time and historicity through its repetition and refraction across timescales, making connections and links between epochs and tying them together in overarching narratives of redemption and fulfilment. Tragedies were thus seen as trifles in this great scheme: "however serious the events of earthly existence might be, high above them stood the towering and all-embracing dignity of a single event, the appearance of Christ, and everything tragic was but figure or reflection of a single complex of events into which it necessarily flowed, at last: the complex of the Fall, of Christ's birth and passion, and the Last Judgment" (Auerbach and Said 2013: 317).

[1] It is worth noting here that *Mimesis* was published in the 1930s and constituted in part a project designed to revalue Old Testament scripture and as a means of refuting Aryan philology.

By reading one text through another, Auerbach's resurrection of figural realism insists on the referential and relational substance of figures. Figural representation "establishes a connection between two events or persons in such a way that the first signifies not only itself, but also the second, while the second involves or fulfils the first. The two poles of a figure are separate in time, but both, being real events or persons, are in temporality. They are both contained in the flowing stream which is historical life" (Auerbach 1984: 53). Figuration connects events, characters and objects to broader narratives. It incorporates them into cultural myths that self-reinforce through their own figuration. In other words, Auerbach demands we take seriously the referential work of figures and how they participate in the production of myths and master narratives of salvation and redemption. It demands that we read texts not in isolation, but in relation to broader patterns, discursive regimes and master narratives. When we do so, we bring to the table those related stories and master narratives and do the work of joining the dots that allows them to fulfil one another, in turn augmenting their cultural power. Auerbach's figures make sense in their potentiation for future reading and fulfilment. His figures are tropic: they turn towards other figures, objects and narratives. They gesture towards something greater than themselves, acting as both signs and referents in a perpetual play of associations. Unlike metaphor or allegory, they do not represent or stand in for ideas on their own. Rather, they gather the stories to which they refer into a coherent narrative of fulfilment, which is gestured at rather than made explicit, requiring the reader to do the work of tying them together.

Foucault's Figures as Objects and Targets of Power

Where Auerbach helps us to understand how, in Western literature, figures are caught up in networks of potentiation and referral that produce narratives of time, history and redemption, the work of Michel Foucault demonstrates how figures have also been mobilised in civic institutions and medical discourse as a means of bolstering biopolitical control. In the first volume of *The History of Sexuality, The Will to Knowledge*, Foucault

delineates his concept of biopower, drawing attention to the relations, modes of organisation, technologies and practices that produce biopolitical subjectivities and forms of life. *The Will to Knowledge* addresses biopower as a mode of governing—a political rationality—that focuses on populations as a whole and the managing of life itself, rather than the behaviour of individuals. Biopower involves the management of sex and reproduction, mortality, health and illness. Yet this management is indirect: it does not come from the diktat of a sovereign, but rather is distributed across institutions such as psychiatry, the family, education, and welfare provision. It produces knowledges and practices (technologies) which, among other functions, dictate what is normal and what is deviant. In *The Will to Knowledge*, he identifies four "strategic unities," or trends in governance, that emerged during the eighteenth and nineteenth centuries and that produced and organised bodies and sex in the service of biopower (Foucault 1978). These strategic unities were the hystericisation of women, the pedagogisation of child sexuality, the socialisation of procreative behaviour and the psychiatrisation of perverse pleasure. They found their objects, and their targets, in four figures around which they coalesce: the hysterical woman, the masturbating child, the Malthusian couple and the sexual deviant. Emerging from sets of discourses around sexuality, procreation and social reproduction in institutions such as the psychiatric clinic, these four figures appear as personifications of what must be regulated and controlled (sexuality in particular) and in doing so police the borders of what is considered normal and healthy. As such, the four figures occupy spaces at both the centre and the limits of power: they are central to how the biopolitical ordering of sex is organised, yet they also occupy limit conditions. They are troubling to the forces that produce them and are subject to techniques and technologies that create them as figures, that target them as objects, that produce them as subjects and that draw on them to augment the forms of knowledge/power they reproduce.

Although the idea of the figure as a technology of power was not elaborated at length in Foucault's work, his four figures of biopolitics nevertheless exemplify the work that figures do in relation to power. Foucault's figures are, on the one hand, the objects and targets, as individuals, of disciplinary modes of biopower and, on the other hand, vehicles for the

generation of collective affects that shape bodies, desires and sensations and order sexual and reproductive life. Individual bodies, biopolitically figured, can become object-targets, yet these same figures are also the technologies through which the affective capacities of populations themselves are produced as object-targets (Anderson 2011, Dawney 2018). They emerge at both the centre and the limit of a historically specific set of regimes that produce bodies and desires according to a particular normative order: as an object-target, particular figures can embody abjects, deviants and villains, or heroes, aspirational figures and leaders. They are propped up by the proliferating institutions and practices that modulate pleasures, affects and spatial configurations. As fragile subject positions that both threaten and suture the present, Foucault's figures not only personalise and give substance to these regimes but also provide ideal types of bodies that become the target of such regimes. On the surface, these figures seem to operate in the service of dominant modes of *power over (potestas)*. Yet by virtue of their limit status, they also expose the contingency of such modes of organisation. This, of course, is Foucault's goal: it supports his lifelong project to undo—and to reveal as contingent—that which we universalise, naturalise and dehistoricise and, in doing so, to point to the possibility of an "otherwise." While Foucault, the critic and historian of the present, does not position as his task to think what such an otherwise might look like, he does end this first volume with a hint at the possibility of a "different economy of bodies and pleasures" (Foucault 1978: 159), opening up a space to consider the transformative potential of figures.

In summary, then, we can situate Foucault's contribution to thinking with figures in terms of his acknowledgement of both how regimes of power can produce and personify figures and, in turn, how they then can prop up these regimes by inhabiting a space at the limits of the normative. As part of his broader project to interrogate the workings of power relations at particular historical junctures, he demonstrates the way in which regimes of governance—such as criminal justice, welfare policy or healthcare—generate figures as targets and objects and, in turn, how these give substance to ideas and values. Above all, Foucault brings the figure to the social sciences, demonstrating its centrality to the analysis of power in modernity.

Haraway's Figurations as Spaces to Inhabit

Our final companion on this journey through conceptual accounts of figuration is Donna Haraway, who picks up and runs with Auerbach's insistence on the referentiality of the figure, yet also draws heavily on Foucault's concern for the ways in which figures are incorporated into regimes of power and play a part in the production of subjectivities. Like the previous two thinkers, Haraway's figures are more-than-textual: they are material-semiotic, and as such they enact worlds through their material configurations. While all three thinkers acknowledge the power of figures to shape worlds, it is Haraway who explicitly adopts the figure as counter-technology or critical device: she creates figures that trouble binaries, draw on and play with master narratives, and offer alternative stories. Within Haraway's figurations, we see both echoes of Foucault's object-targets in terms of the binary figurations that she deconstructs and also of the attention to their tropic capacities and role in storying the present that she takes from Auerbach.

Despite Haraway's mobilisation of figures throughout her work and, indeed, her assertion that "I feel like I live with a menagerie of figurations" (Haraway and Goodeve 2000: 135), her oeuvre contains very little direct discussion of figuration. Her 1997 book *Modest_witness@second_millennium:femaleman_meets_oncomouse: feminism and technoscience* most explicitly lays out her understanding of figuration, and its emergence as a mode of critique and analysis can be seen in much "new materialist" cultural studies. Haraway's figures are closely tied to relations of power, working to reflect, diffract and enact them otherwise (Haraway and Randolf 1997, Haraway and Goodeve 2000). Haraway's figures have two main features. Firstly, as in Auerbach, they are tropic, referring outside of themselves in a way that troubles certainties and established binaries: "figures do not have to be representational and mimetic, but they do have to be tropic; that is, they cannot be literal and self-identical. Figures must involve at least some kind of displacement that can trouble identifications and certainties" (Haraway and Randolf 1997: 10). Secondly, figuration is understood as a mimetic practice that maps our world. It produces stories to which subjects can attach themselves or can gain

purchase on life. Her mode of critique is to make a difference in these material-semiotic apparatuses, to unravel their telling and tell other stories in the process. For example, her figure of the cyborg offers a feminist vision of science and technology that operates against both masculinist appropriation of technology and forms of feminist subjectivity that revert to the natural (Haraway 1991).

For Haraway, drawing on Auerbach, figures are "potent, embodied—incarnated, if you will—fictions that collect up the people in a story that tends to fulfilment, to an ending that redeems and restores meaning in a salvation history" (Haraway and Randolf 1997: 44). Her recognition of the vertical referential power of figures in producing narratives of redemption emerges directly from Auerbach's work and echoes his teleological bent. Yet her own figures are playful and subversive. She offers them to the reader as sites to grasp onto the relations of gender, power and knowledge that produce them, but also as positions from which to enact different subjectivities: the cyborg, the oncomouse, the companion species and string figures are all "performative images that can be inhabited" (Haraway and Randolf 1997: 11). They are images that do something, that actively participate in the making of worlds. Contemporary forms and logics of life are understood as an "implosion of bodies, texts and property" (Haraway and Randolf 1997: 7)—a menagerie where the literal and the figurative, the factual and the narrative, the scientific and the religious, and the literary are always drawn together (Haraway and Goodeve 2000: 141). Haraway offers us a critical practice of figuration that involves paying attention to the production, appearance and work of figures and finding ways of detaching them from salvation narratives. These figurations recognise the forms of domination they emerge from and the boundaries that they shore up. In exposing and disrupting these boundaries, such as the production of the unity of the self that relies on women's homogenisation and exclusion, her figures provide the conditions of possibility for her ethics of coalition. In response, her figurations are an experimental, playful and creative means for thinking outside of binaries and developing new forms of embodied subjectivity. In relation to technoscience, for example, she writes, "We inhabit and are inhabited by such figures that map universes of knowledge, practice and power. To read such maps with mixed and differential literacies and without the totality, appropriations,

apocalyptic disasters, comedic resolutions, and salvation histories of secularised Christian realism is the task of the mutated modest witness" (Haraway and Randolf 1997: 11).

Drawing on Haraway, scholars in feminist science studies, environmental humanities and posthuman thought have developed a distinctly feminist practice of figuration. Like Auerbach's discussion of the Old Testament as stories that precede and give rise to a new world, feminist figurations operate *pre*-figuratively: they enact possible futures. For example, Rosi Braidotti's figuration of the posthuman is imagined as a "conceptual persona, a navigational tool that helps us illuminate contemporary discursive and material power formations" (Braidotti 2019:22). The posthuman works by creating minor knowledge systems and spaces of subjectivity and decentralising the figure of the human. In doing so, figurations like the posthuman embrace nomadic and fugitive subjectivities and question normative, exclusive and static modes of subjecthood. "The posthuman as cartographic figuration is a branch of contemporary critical thought that allows us to think of what 'we' are ceasing to be—for instance, the Eurocentric category of universal 'Man'. It also sustains, however, the effort to account for what 'we' are in the process of becoming—the multitude of ways in which the human is currently being recomposed" (Braidotti 2019: 7).

An Agenda for the Study of Figuration: Figures and Affect

Above, I have outlined a short and rather incomplete genealogy of critical work on figures in order to set an agenda for their study. This agenda makes the following claims about the work that figures do and about the contribution that a figurative approach offers to critical theory. Firstly, figures are powerful world-making technologies: in Auerbach through the ordering and of time through Christian theology; in Foucault through their role in producing regimes of knowledge and biopower; and in Haraway through their potential to disrupt structuring orders. This means that we need to take them seriously as objects of analysis. Secondly,

as critics we need to consider figures within a broader architecture of figuration to make sense of the stories they tell about the world. Thirdly, there is political work to be done in amplifying minor figures or producing and looking after the figures that we feel can contribute to a better world. Finally, I suggest that analysing the work that figures do and adopting critical and creative practices in relation to figures reveals their vitality and affective force in sculpting worlds: how they lure us towards particular political architectures and provide substance for aleatory and minor ways of being and relating. It is for this reason that we need to pay attention to the affective capacities of figures.

The "affective turn" in the humanities and social sciences has drawn on a range of theoretical genealogies, including the psychiatric/psychoanalytical work of Tomkins, Freud and Sedgwick, and the Spinozist, materialist lineage of Deleuze and Whitehead. In the latter genealogy, affect refers to the capacity of bodies to be moved and to generate intensities in relation to other bodies, objects and ideas (Clough and Halley 2007). In this context, then, the affective capacity of figures refers to their ability to generate feelings and embodied responses in those who encounter them: responses that are tied to emotions such as shame, fear, revulsion, love and joy. In mobilising affective responses, figures draw us in to their narratives, tying us deeper to the stories that they personify. We can see this, for example, in the way that the figure of the wounded soldier is mobilised in the UK to tether affects to discourses of nationalism and militarism (Dawney 2018), or how the figure of the bereaved mother bolsters pressure groups like Mothers Against Violence (Dawney 2013). Figures personalise structuring myths and draw on them for their power: in both these cases, they harness affects through making visible corporeal vulnerability and suffering. Throughout the Christian tradition, religious authority becomes tangible and knowable through embodied pain and wounding, most specifically through the body of Christ and the Virgin Mary. The Christ and the Pietà, peppered as they are through the history of Western cultural forms, lie behind the contemporary staging and personalisation of suffering offered through the figures of the mother and the soldier, and it is through these tropisms that they are recognised, understood and their affective power amplified.

If figures operate at the level of affect, then the study of figuration needs to acknowledge the space of encounter: how figures make

experience intelligible to subjects in a particular way and how they form the material relations of bodies, texts, technologies and logics that constitute discursive formations. Figures are involved in affective relations with historied, situated publics. They work on our desires and generate intensities, moving bodies by tapping in to cultural myths and undercurrents and acting as loci for affective forces that coalesce around them. This "grip," or, as Claudia Castaneda puts it, ability to "captivate" (Castaneda 2002), is central to their power. Attending to the grip reveals their vitality and affective force in sculpting worlds: how they lure us towards particular political architectures. Adopting a critical and creative practice in relation to figures in turn provides substance for alternative forms of life. It enables us to ask what desires, anxieties, material insecurities or existential fears are triggered through these figurations, both augmenting what is there already and contributing to the ongoing formation of the social as figures attract and seduce, or alienate, or horrify.

Lee Edelman's Lacanian polemic on reproductive futurity, *No Future*, positions the figure of the child as a central organising point around which normative understandings of life and futurity are gathered, positioning the queer as its abject other (Edelman 2004). Through his invocation and analysis of these figures, Edelman effectively demonstrates the play of figurations and the work that figures do: their mutual structuring of normativity and its outside and the centrality of affect to their workings. Via Tiny Tim, the orphan Annie and Peter Pan, Edelman's figure of the Child underpins the heteronormative order and requires the reproduction of sameness of identity. If the child stands for life of a particular structural order, the queer haunts its outside: the nonreproductive eroticised narcissism that can only be for death and the nonreproduction of the Same. The queer can do no more than reject the child and embrace the death drive. As the part with no part, he (for he does seem to be a he) has no place within the reproductive futurity figured by the child. He must stand with death, to queer the way that life is figured. Whatever our take on Edelman's argument, what he successfully demonstrates is the power of the figure to embody normative orders and to suture them through their appeal to already existing affective channels stirred by vulnerable embodiment. The familial shaping of affective bodies produces subjects with the capacity to be affected by the Child according to the norms of reproductive futurity. We can see this too in Atwood's twisted

near-future take on reproductive futurity, where it is Baby Nicole who adopts the childish innocence that stands for the future that must be protected, by both sides of the Canadian border and whose power to generate affective attachments is used for political gain.

For Edelman, the politics of queerness is a politics of refusal: to refuse to take part in the conflation of life and familial orderings of reproduction, to refuse to take subject positions that respond to these orders and to refuse the progress-oriented drive for a better world. The queer, as the constitutive outside of reproductive futurity, is defined by lack and by negativity, yet by actively inhabiting that space, by refusing to adopt normative myths and by permanently inhabiting the space of negativity, the queer remains as a spectre that can expose and dismantle the normative object. The figure of the queer in Edelman's work, as in Haraway's menagerie of figurations, pushes against these orderings yet is constituted through them. These figures work to produce other subject positions; not as an unspecified otherwise, but to fabricate new architectures of subjectivity that are always a product of those boundaries and binaries that they interrupt. Haraway's figures are, she claims, a kind of "gift"—she offers them up as templates for ways of life that rely on and generate different narratives. Similarly, Braidotti, in her discussion of the figure of the posthuman, argues that figures offer a "frame for the actualisation of many missing people, whose 'minor' or nomadic knowledge is the breeding ground for possible futures" (Braidotti 2019:23).

When Figures No Longer Hold

These alternative figurations, as with all figures, are manifestly unstable. They rely upon, and prop up, particular structures of feeling and these structures move with the shifting ground of the material. Figures may no longer hold; they may be appropriated or subsumed within normative orderings that reduce their radical potential.

By virtue of their cultural and affective power, figures can be radical. Yet, if they work through affective encounters with situated bodies, it follows that they can only resonate in the context of specific historical circumstances. Figures "collect up and reflect back the hopes of the

people"—they provide a sense of the possibility of salvation or damnation or conclusion (Haraway 2000). Yet sometimes, we find that their grip no longer holds or that their potential is diminished through their resonation with other public myths. They may not always appeal as they once might: as Michelle Bastian points out, figurations "need to be attractive, productive, and inviting. They need to be inhabitable and to resonate with already existing collective meanings—very difficult criteria to fill" (Bastian 2006: 1030). Similarly, Braidotti highlights the need for figurations to resonate with contemporary bodies: "All figurations are localized and hence immanent to specific conditions; for example, the nomadic subjects, or the cyborg, are no mere metaphors, but material and semiotic signposts for specific geopolitical and historical locations. As such, they express grounded complex singularities, not universal claims" (Braidotti 2018: 34). This is apparent in Bastian's discussion of how Haraway's cyborg figure was appropriated through science fiction, Silicon Valley and cyberpunk discourses, shifting away from its original figuration in the service of a pluralist, transversal feminist subject. As early as 2000, Haraway expressed concern that "cyborgs [can] no longer do the work of a proper herding dog to gather up the threads needed for critical inquiry" (Haraway 2003: 4). As Haraway has made clear, much of this appropriation confuses the figure with the referent. In describing what she calls the "distressing half-life of the cyborg," she notes how the specificity of the cyborg figuration has been diluted and dehistoricised and become a "maddening" way of describing any interface between humans and machines (Haraway 2000). Nevertheless, Bastian rescues the cyborg from technofascism, arguing that its undecidability and multiplicity allows for its "lost" aspects, such as those that highlight coalition, to resurface through counterhegemonic articulations, including US third-world feminism. Figures, as pathfinders for other ways of living and being, work differently in different contexts. This becomes most clear at the between times—the junctures where historical moments give way to others, and the spaces of lag and emergence that appear at these times (Williams 1977). We might understand the contemporary juncture as such a time—sitting within neoliberal architectures, yet holding on to the certainties of the Fordist welfare state. It is at these times when relied-upon figures become co-opted or no longer resonate with lived

experience. Lauren Berlant names this an "impasse"—a temporal and spatial moment where incumbent figures and desires no longer work for us, yet remain as impossible and damaging objects that keep us wedded to normative identity positions (Berlant 2011). The anthropologist Anna Tsing has argued that the figure of the abstract worker as a hinge for labour politics no longer resonates in the context of supply chain capitalism, where the decline of the white male union has heralded the rise of the entrepreneurial servant/manager as aspirational figure (Tsing 2009). The lack of grip that the figure of labour holds is a challenge for a labour movement whose very being rests on the production of a particular figure of labour—one that is no longer up to the job. Berlant argues we need new affective infrastructures and, I would add, new figures (Berlant 2016). Yet the myths and narratives that might be better equipped for dealing with the precarious present perhaps need more work and encouragement. If democratic life is indeed subsumed under the metric of the market, then new figures are needed to act as guides towards different forms of subjectivity and collective life.

Conclusion

This chapter has outlined an agenda for thinking with figures through a number of intersecting claims. Firstly, it has highlighted a series of key texts that inform study of the work that figures do in cultural politics, demonstrating how they can be read together to both highlight the cultural power of figures and work with counterhegemonic figurations. Secondly, it has demonstrated the interrelationship of affect and figuration and the need to pay attention to how figures lure and harness affects. Finally, it has shown figures to be labile and vulnerable: their cultural specificity and inherent instability mean that we cannot ever assume their stasis. In tying these claims together, this chapter is both an invitation to think with figures and a suggestion as to how this might be done.

As I have argued throughout this chapter, figures often work as a locus for affects, attachments and public feelings. It is the task of the critic to both identify and recognise how figures shape political and cultural life and to analyse the mechanisms through which this takes place—how the

"grip" of figures is established, where their appeal lies, what their world-building capacities are and how they act upon the world. The affective approach to studying figures outlined here has methodological implications too; bridging the space between body and text in this way is no mean methodological feat, nor is it a simple matter to trace figures accurately across their many and varied cultural articulations. Nevertheless, the concept of the figure invites an approach to cultural investigation which refuses to lie entirely within the text or the subject, instead focusing on their mutual composition in relation to wider political structures. A figural critique thus needs to be experimental: it may attempt to inhabit the impossible space between representation and world, or tell stories, or connect seemingly disparate objects. It may work with others to generate new figures or make new sense of existing ones. As critics, we must be aware of our role in the process of figuration and sensitive to the politics of our own intervention: Baby Nicole, like Edelman's Child and Foucault's hysterical woman, can be put to work in many different ways, and we would do well to heed Haraway's contention that "it matters which figures figure figures" (Haraway, 2016:101). Figurations, like many aspects of disruptive, excessive life, run the risk of capture—of losing their radical potential through their incorporation into more dominant forms of imaginary. An approach that acknowledges their shifting relationships to power is essential. It takes work to hold on to the potential of the figure and rearticulate its transgressive forms. In producing and articulating feminist figurations, we need to be vigilant to the extent to which they still hold true and to how they interrupt themselves and each other: we need to take care of our figures.

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3

In "The Cloud": Figuring and Inhabiting Media Milieus

Scott Wark

Introduction: Media Figure

Our discussions of digital media are full of figures. Most of our online interaction takes place on webpages that we visit by entering an address, or platforms that we access through portals. These services circulate data on networks and interact with one another using interfaces. Moreover, these services were once hosted on local machines known as servers; now, the data they process resides in a place we call the cloud. The hierarchical information architectures that underpin these services are known as stacks. Sometimes, we think of the encompassing system of data, devices, interfaces, and services—"the internet," in other words, as it's actually lived—as an ecology or an ecosystem, which is to say, a self-governing, self-organising, holistic, and emergent system that we, in some sense, inhabit. Other times, we just call it life—work or leisure, productivity or entertainment, self-expression or data capture.

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These terms, and others like them, make up the language that we use to denote, describe, and engage with contemporary media. Many of these terms have specific meanings in technical fields, like computational science and human-computer interaction: interfaces allow users to communicate with soft- or hard-ware (Hookway 2014); platforms are a type of computational system organised around the decentralisation of content production and the recentralisation of data capture (Helmond 2015); cloud computing provides off-site computational resources, software services, or storage to customers on demand, obviating the need to maintain systems and services on their own premises (Hu 2015). But they are also woven through the vernacular language we use to help us make sense of the vast, complex, distributed, and encompassing media systems that underpin life today. These systems operate at speeds and extend across scales—both vast and microscopic—that exceed embodied human perceptual and cognitive capacities. They are made up of media technologies that are otherwise imperceptible to their users. This is where figures come in to play. Interface, platform, cloud—each is a technical, computational term, but each is also a figure. In this chapter, I want to formalise the role that these figures—and others like them—have in our engagements with media. In brief, the proposition I want to develop in this chapter is this: figures provide a means for making sense of how complex, distributed, and opaque media-technical systems inform, condition, and shape contemporary life.

This proposition relies on a somewhat-idiosyncratic understanding of its key terms: figure, inhabitation, and media. Rather than conceiving of figures as symbolic phenomena—as representations, metaphors, or figures of speech—I want to argue that figures make media inhabitable: that they are the means by which media can be lived with, lived through, and lived in today. The point of departure for my conception of figures is Donna J. Haraway's hugely influential claim that we ought to understand figures as "performative images that can be inhabited" (1997: 11). For Haraway, this claim sits within a theoretical framework designed to undermine distinctions between the world and our symbolic representations of it: understood as "material-semiotic processes," her figures become a critical means for both understanding the world as it is, and for actively *making* new worlds that are inhabitable by—and amenable to—a

variegated "menagerie" of human and non-human beings (see Giraud et al. 2018). Drawing on Haraway's work, I want to retain the idea that figures can be "inhabited." But I want to revise this inhabitation's terms. I want to focus on "worlds" constituted—conditioned and shaped—by large-scale media-technical systems.

Haraway's vision of reality is messy, hybrid, and multiple. For her, there is not one world, but many; these worlds are not just populated by *us*—that is, by humans—but by collectives of beings that undermine distinctions between nature and culture, or humanity and its others (Thiele 2021). In invoking the category of "materiality" to ground these multiple messy worlds, Haraway nevertheless tacitly acknowledges that worlds are conditioned by a fundamental "ground": *the* world, our Earth, which is the ultimate source of, and limiting condition on, their potentiality. It follows that as the world changes, so too must our conception of figures. Drawing on Benjamin H. Bratton's concept of "planetary-scale computation" (2015), I want to argue that ubiquitous media have changed the nature of the "worlds" that figures can figure by establishing a new, globalised ordering regime and by providing us with a new technical means to perceive the world itself as a large-scale system. These worlds are different in kind: we still require figures to render them inhabitable, but the modes of inhabitation they engender are different.

This proposition relies on a broader and rather more ecumenical conception of media and technology than typically circulates in the humanities and social sciences. Drawing from recent work in media theory, I want to argue that media's networked distribution, their ubiquity, and their automated capacity to collect and process huge amounts of data mean that, in the aggregate, they also constitute *milieus*. In broad terms, a milieu is an environment, territory, or ecosystem—and, as media theorists like John Durham Peters (2015) and Antonio Somaini (2016) argue, it can also be profitably extended to media. Conceiving of media as milieus provides us with a conceptual means of recognising that, at scale, media constitute places that can be inhabited. Milieu literally means "middle place" (Peters 2016: 47): extending the concept of "milieu" to encompass media provides us with a conceptual language to articulate their capacity to not only organise work or leisure but engender the mediated environments in which contemporary life increasingly takes place.

Conversely, though, I also want to emphasise the crucial role that figures play in rendering such environments inhabitable at all.

After outlining Haraway's concept of figures, this chapter will illustrate how they make media inhabitable by analysing one of contemporary media's key figures: "the cloud." For marketers and computer engineers alike, the cloud refers to computational services that are accessed remotely using networked technologies rather than being run by a user, customer, or company on-site. Over the past few decades, though, this term has expanded into something much more encompassing. Depending on one's dispositions, attachments, and responsibilities, life is increasingly lived *in* "the cloud." Haraway's concept helps us to understand what this means. What links how "the cloud" is used now and how it was used by early systems administrators and engineers is its capacity to capture and articulate aspects of computation that are otherwise difficult to represent. This point is crucial: digital media are often characterised by their complexity, distribution, and opacity—above all, the imperceptibility of their operations to those who use them. Though they might shape worlds, their operations are not straightforwardly commensurable with representational epistemologies. The computational figure of "the cloud" is therefore the latest in the line of cloud-figures that mark out the limits of what can be represented (Damisch 2002). The transition from *a* cloud to "the cloud" is one from a delimited and specific symbol for a computational network to an articulation of distributed, complex, and encompassing technical condition of contemporary life that might only be accessed intermittently, but which nevertheless shapes what it means to live in the world today—a mediated milieu.

As figure, "the cloud" transfigures what is heterogeneous, complex, and unrepresentable—media-technical systems that operate at speeds and scales beyond *human* perception (Mackenzie and Munster 2019)—into what can be lived with and lived in. This, I want to argue, is precisely why we need figures: to compass the gap between what is in excess of representation yet nevertheless conditions a life lived with, through, and in media.

Figure, Inhabitation

Haraway's concept of figures emerges from a mode of intellectual enquiry conducted as a *practice*: one that's dedicated to thinking through the divisions that pattern dominant—rationalised and masculinised—modes of knowledge production that are founded on the diminution of nature. Though it has proven to be hugely influential across the humanities and social sciences—and in particular for feminist science and technology scholars—it requires some explication, because much of its substance is articulated in her critical engagements with what she calls "technoscience"—the institutionalised and industrialised practice of conducting scientific research and producing technological innovations for profit (1997). While we no doubt associate this practice and the figure most closely with her most influential piece of writing—"The Cyborg Manifesto" (1985)—she comes closest to articulating what figures are in later works.

In *When Species Meet* (2008), Haraway conceives of figures as "material-semiotic nodes or knots in which diverse bodies and meanings coshape one another" (4). This claim bears further unpacking, and it helps to read her statements at the start of this book with some at the start of another. In *Modest_Witness@Second_Millennium. FemaleMan_Meets_OncoMouse: Feminism and Technoscience*, Haraway characterises figures as "tropes." Playing on this word's implicative richness and its capacity to evoke both figurative use of language and, given its origin in the Greek word *tropos*—that is, "to turn"—a sense of spatiality, movement, agency, and worldly instantiation, Haraway bends figures into world-making contrivances (Phan 2019: 24). Her figures are precisely *not* "representations or didactic illustrations," or semiotic phenomena that operate in a symbolic register, as do metaphors, analogies, or allegories, but conjunctive entities in which "the biological and literary or artistic come together with all of the force of lived reality" (2008: 4). It's hard to resist falling into a poetic register when trying to articulate what figures are because they gain so much conceptual traction through this reactive meeting of modes. Their tropic quality—their tendency *to figure*, in the active sense—can only be understood conjunctively, as an "implosion of sign and substance, a

literalness of metaphor, the materiality of trope, the tropic quality of materiality" (Haraway quoted in Hughes and Lury 2013: 795).

Grasping the tropic plenitudes contained within figures helps us to understand Haraway's oft-quoted proposition, that figures ought to be understood as "performative images that can be inhabited" (1997: 11). "Inhabitation," here, doesn't construe figures as *containers* for other—hybrid—entities. These figures are real and actual entities (Hughes and Lury 2013: 795), but they don't exist outside of the tropic plenitudes that they gather. They shape and are shaped by these plenitudes, constantly turned by them even as they turn them otherwise—towards other figures. This gathering—or figur*ing*—is what invests figures with their actuality and what takes them beyond being strictly semiotic entities. Haraway makes this clear in *Modest_Witness@Second_Millennium*:

> [f]or example, think of a small set of objects into which lives and worlds are built—chip, gene, seed, fetus [*sic*], database, bomb, race, brain, ecosystem. This mantra-like list is made up of imploded atoms or dense-nodes that explode into entire worlds of practice. The chip, seed, or gene is simultaneously literal and figurative. (1997: 11)

Figures can be used as pivots that articulate worlds that are made in and through the messy and hybrid practice of doing and living. These worlds are entangled in relations that don't respect epistemological distinctions, like nature versus culture or, indeed, theory versus practice. So, for Haraway, to "inhabit"—understood, in the broadest sense, as *being*, played out by all kinds of entities through what they *do*—is to figure and be figured.

Herein lies the figure's double function. When Haraway claims that "[w]e inhabit and are inhabited by such figures that map universes of knowledge, practice and power" (1997: 11), she makes figures diagnostic tools for understanding how worlds are put together. The titular "modest witness," for instance, figures a mode of scientific knowing underpinned by a self-effacing—hence "modest"—scientific subject who guarantees scientific knowledge by witnessing its production through demonstrations (1997: 32). As Haraway notes, the right *to* witness belonged to those gendered male, raced as white, and of a moneyed elite. But what

has made Haraway's figures so influential and suggestive for critical thinkers is that their world-making capacities can be used creatively as well as diagnostically (see Dawney, this volume; Bastian 2006). Because figures make worlds, one can make alternate worlds by making alternate figures. They aren't just maps *of* worlds; their tropic qualities mean that they actively *map* worlds, drawing them together in their wake.[1] Figures promise their proponents not only a means of understanding how worlds cohere but also a means to conjure alternate worlds that might just harbour more equitable, more just, or more sustainable ways of being-together.

While acknowledging that the creative potential Haraway invests figures with has been influential, I want to emphasise her claim that they can be "inhabited." What makes Haraway's figures—and, arguably, figures *per se*—such useful and efficacious theoretical tools is their capacity to render complexity something that can be lived with, lived through, or lived in. Recall the "mantra-like list" of chip, gene, seed, foetus, database, bomb, race, brain, and ecosystem. Construed as figures, these things become points of conjunction from which worlds emerge. To reduce them to representations not only re-introduces the separation between symbolic and material that figures are designed to dissolve, it also eschews the basic theoretical insight of this conception of being. Inhabitation—being and living—must necessarily be understood as being-*with*. So conceived, "inhabitation" is not a state that one simply chooses to adopt for a time before choosing another. Figures have more agency than this: they embroil *us*—conceived, broadly, against distinctions like those between humans and their others—in their worlds. This is where the claim that figures are "actual" gains its force.

Here, though, we also butt up against the limits of Haraway's conception of figures. We can explain how by asking a reflexive, epistemological

[1] We need to attach a caveat to this invocatory power: figures, as commentators like Astrida Neimanis have noted, are rife with "dangers" (2013: 26), because one doesn't always know whether the worlds actualised through the tropic figure will be for the good. We see this most clearly in Haraway's most influential figure, the cyborg (1985). This figure started out as a means of reclaiming technology for feminist ends and in opposition to "technoscience"; almost four decades later, though, it has arguably been recuperated by these very same forces to figure hyper-commodified, masculinist technological futures that reinstitute economic and racial hierarchies (Phan 2019; Cave and Dihal 2020).

question: what are figures *for*? That is, what *problem* does Haraway's critical-theoretical practice respond to? The force figures contain has its own epistemological efficacy. Ultimately, thinking with figures is counterposed to modes of thought premised on distinctions: nature and culture, male and female, human and non-human, and so on—right through to the ontological distinction that figures themselves challenge, that between the material and the symbolic. Figures don't attempt to dissolve these basic categories, but rather demonstrate how holding them in tension can engender an endlessly productive practice. The "string figures" that recur again and again in her thinking figure this aspect of figures (Haraway 2016). The gestures they invite—tying, folding, knotting, forming, and unravelling—dramatise a mode of being and doing in which distinctions-between—here, hand and string, but equally, material and symbolic—are stretched and tested, but never actually undone. Without these distinctions, figures arguably lose their epistemological efficacy, that is, their capacity to make worlds appear.

In saying this, I don't mean to imply that Haraway's figures are essentially idealist. Far from it. My claim is that they are designed to respond to a particular kind of (material-semiotic) problem: to show us messiness where we want to see distinctions; to, in other words, unspool relations from seemingly discrete objects. The problem I want to use Haraway's conception of figures to think through is simpler. Instead of using figures to demonstrate the arbitrariness of inherited distinctions, I want to use them to explicate how otherwise-incompatible *things*—understood, broadly, to encompass not just discrete objects but also systems, processes, and configurations—*become* inhabitable. What I want to propose is that we use figures' capacity to make worlds in order to live in, through, with the complexity that characterises contemporary media.

I'm interested in a particular case: what I've been calling large-scale media-technical systems. Before turning to the example of "the cloud" to illustrate how figuring renders such systems inhabitable, though, I want to spend some time translating Haraway's concept into a media-theoretical register.

Mediated Worlds: Milieus and Non-representability

Figures find a particular kind of efficacy in large-scale media-technical systems. Using Haraway's conception as a basis, the proposition I want to make is that figures are necessary intermediaries between worlds made by media and their inhabitants. The point of departure for this proposition is an intuition: digital media are full of figures because figures render otherwise-unrepresentable technical ensembles apprehensible and, therefore, inhabitable. This proposition relies on three interrelated lessons that I want to draw from media theory and related disciplines.

First, our contemporary situation invites us to expand what we mean by "media"—and consequently, how we understand their capacity to make worlds. Setting aside canonical debates about whether media theory ought to focus on technical devices themselves or on the people, practices, or societies involved in an instance of mediation (see Peters 2010), we can say that, in general, media are typically conceptualised as means of communication: as "middles" that join senders and receivers across time and space (see Guillory 2010). As scholars like John Durham Peters and Antonio Somaini have recently argued, however, this dominant conception of media has always been shadowed by another: the idea that media constitute environments. Peters and Somaini both note that the concept of "media," which comes to the English language via the Latin word *medium*, is the product of a bad translation of Aristotle's work from Ancient Greek. The source of the word "medium" is a Greek word, *metaxy*, which is not only an intermediary substance or thing but an intermediary *place*: a "middle ground" (Peters 2015: 46; Somaini 2016: 30; see also Kittler 2009). For Peters, the word "medium" has always contained the potential to be understood in an expansive sense, encompassing not just the discrete device, the means, or the middle, but the "element, environment, or vehicle in the middle of things" (2015: 47). Peters recovers this alternate sense of media using the word "milieu," which means "middle-place." This concept gives us a way to understand how media can constitute worlds. In Peters' work, such worlds need not be digital; the spread of calendrical techniques, for instance, also makes

worlds (2015: 176-184). But it does give us a particularly useful concept for understanding how ubiquitous digital media establish milieus that can be inhabited.

Second, I want to propose that we use the concept of the media milieu to signal a distinction between different kinds of worlds harboured by different kinds of figures. The worlds assembled by the "chip" or "database"—to recall two particular, media-technical figures invoked by Haraway—are not necessarily of the same order as those assembled by "gene or seed." On the one hand, Haraway's conception of figures is capacious enough to encompass some categorial splicing. It doesn't matter if the world unfurled from the "gene" intersects or overlaps with the world harboured by the "chip," because "worlds" arise in and through practices and modes of relational being that reorder the kinds of distinctions one might be tempted to make between, for instance, pre-industrial farming techniques and an industrialised agriculture that relies on computational infrastructures for its logistics. On the other hand, there's an argument to be made that large-scale media-technical systems engender a novel *kind* of world.

We can express this in concrete terms. Benjamin H. Bratton has recently proposed that computation has reached such a degree of complexity and distribution over the past few decades that it now operates at what he calls a "planetary scale" (2015). He explains this by pointing to the transformation of computation from a technical process—something conducted by specific machines on specific problems—into a "global infrastructure" that supports all kinds of operations in all kinds of spheres (14). The overarching point he wants to make is that the emergence of planetary-scale computation challenges sovereignty: today, he argues, the global order is organised not only by interactions between nation-states or by the workings of globalised markets but by computational infrastructures—namely platforms—that now rival states and markets for power and influence (see 327-31). But we can also translate his assessment of contemporary computation into the language of figures.

Amongst its many uses, this global infrastructure provides new tools to model the world itself. Bratton notes, for example, that planetary-scale computation is a precondition of contemporary climate science, which uses world-wide data collection and huge collaborative modelling

projects to understand climate change and to predict the future world it might engender (2015: 305-6). By giving us new tools to model the world, this infrastructure gives us a means of conceiving of the world in its entirety and as a—concrete and material, rather than ontological—limit-condition for life itself. Planetary-scale computation institutes a historical break: all "worlds," to re-introduce Haraway's language, subsist in or on *this* one. Does this mean that all "worlds" supervene on computation? Not necessarily. Insofar as all "worlds" supervene on an actual and material *world*—which is how I understand the irreducible "material" part of Haraway's "material-semiotic" couplet—perhaps what it does mean is that those that do supervene on computation are no longer of the same order as the worlds figured by Haraway even a few decades ago. As the world changes, so, too, does the material from which figures can be made.

Bratton's concept of planetary-scale computation provides us with a way of qualifying what the claim that media are ubiquitous actually means: media are ubiquitous not only because they are everywhere or because they pervade daily life, but because they constitute new ways of conceiving, and so inhabiting, *the* material world. By referring to worlds figured in, by, or as media as "milieus," I mean to signal this distinction in kinds of world. At first blush, it might seem as though the revision of Haraway's concept of figures I'm proposing amounts to an entirely different concept: if mediated worlds are made of distinct stuff, and if we interpose "milieus" for her concept of "worlds," are we not simply slipping her figures into a different conceptual register? Just as Haraway's figures can be revised using lessons drawn from media theory, though, media theory can also be revised using lessons drawn from Haraway.

In her explication of figures at the beginning of *Modest_Witness*, Haraway makes a claim that perhaps isn't always given full weight: "[a]ll language," she says, "including mathematics, is figurative, that is, made of tropes, constituted by bumps that make us swerve from literal-mindedness" (1997: 11). In her conception, figures pervade the languages we—humans—use to make sense of the world around us. Haraway's claim that figures are actual material-semiotic things that can be inhabited can be read as a limited claim, referring to particular instances of figuring. But it also contains the potential to be extend much more

broadly. My claim is that that media theory actually *needs* figures to make media both inhabitable and conceptualisable. Figures translate media's otherwise-incommensurable operations into a (conceptual) language that can be used to grasp the conditioning effects they have on our environments and, thereby, on contemporary life. Rather than demonstrating that (ontological) distinctions contain multitudes and messy relations, then, the particular, media-specific instance of figuring that I'm indicating here does something else entirely: it draws heterogeneity—the objects, systems, processes, infrastructures, and configurations that constitute planetary-scale computation—into worlds.

This mode of figuring is necessary for media theory, finally, because—and this is the third lesson I want to draw from media theory—contemporary digital media and the worlds they engender are incompatible with a particular epistemological operation: *representation*. Scholars who have been working on machine learning and artificial intelligence, and the platforms that operationalise these techniques, have explained this incompatibility in a number of instructive ways. In many cases, it's impossible to reverse-engineer the automated processes these systems implement. This is not only because they operate at a scale that exceeds representation or that the algorithms they use are proprietary—though these barriers are real and difficult to surmount—but because they employ computational techniques that are often correlative and inductive. Once implemented, machine learning techniques of the kind that underpin computational processes—like sorting, ranking, categorising, recommending, and so on—incorporate recursive and self-optimising techniques that will produce different outcomes when trained on or applied to different sets of data (Mackenzie 2017). It is difficult—or often even impossible—to directly observe what these media do without tools to render them *observable* (Mackenzie 2018; Rieder and Hofmann 2020). For Louise Amoore, these media-technical systems represent a change in data processing's organising "paradigm" from "observation, representation, and classification" to what she calls "perception, recognition, and attribution" (2020: 41). That is, although the problem presented by media-technical systems premised on large-scale data processing is often presented in phenomenological terms—these systems are difficult to conceptualise because they exceed human representation (Mackenzie and

Munster 2019)—it's better conceived of as a problem of un/non-represent*ability* or a problem engendered by such systems' complexity and the consequent challenge they pose to efforts to render them not only observable to non-machinic modes of perception but also, as Amoore points out, *actionable* by non-machinic entities (2020: 50; 55).

This is why we need figures to be able to conceptualise media. Per Haraway, figures are much more than "representations or didactic illustrations." As tropes, they tug at actual relations, demonstrating how they hold together and pulling them in to other and new configurations. The figure of the "milieu" that's gained traction in recent media theory articulates mediated worlds that are not directly representable, and which emerge in the wake of changes to *the* world brought about by the emergence of planetary-scale computation, but which can nevertheless be inhabited. In other words, this means of figur*ing* allows us to make sense of how complex, distributed, and opaque media-technical systems inform, condition, and shape contemporary life.

To illustrate how this works, I want to shift registers and turn now to a central figure of contemporary media—"the cloud."

In "The Cloud"

In 2011, the National Institute of Standards and Technology—a laboratory that reports to the United States Department of Commerce—prepared a document outlining an official definition of "cloud computing":

> Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (Mell and Grance 2011: 2)

Pared down to the minimum words needed to assure institutional uptake, this is a bare technical description of what's meant by the term "the cloud." But before it became a standard regulating government procurement, "cloud computing" began in marketing. Antonio Regalado

traces the term to policy documents produced in 1997 by Compaq—later acquired by Hewlett Packard—that pre-empted the shift that IT companies would eventually make a decade or more later from selling discrete products, like software programmes or computers, to selling distributed storage, computational capacity, or subscription-based software packages hosted on remote servers (Regalado 2011; see Kaldrack and Leeker 2015). According to the likely progenitors of the term who Regalado interviewed, it originally derived from the drawing of a cloud that engineers would use to represent networks between computers (2011). Whether or not these Dotcom-era tech workers are visionaries for coining the term "cloud computing" is a moot question. What makes this anecdote interesting is that it registers the epistemic shifts that this term has undergone between 1997 and 2011 and between 2011 and now.

Let's start by enumerating the different ways "the cloud" figures and is figured. First, there's the figure as conceived by computer scientists and systems engineers. Tung-Hui Hu suggests that this particular figure was first used by those responsible for computer networks to locate the computers they had "direct knowledge of" in "the same epistemic space as something that constantly fluctuates and is impossible to know," which is to say, the entire system on which such networks rely, but over which they have no control: "the amorphous admixture of the telephone network, cable network, and the internet," amongst other things (2015: x). Second, there's the figure as conceived by the marketers whose progenitors Regalado was so interested in tracking down. This cloud figures a promise: computation recapitulated not as hard- and soft-ware that has to be administered, maintained, and configured (see Spencer, this volume), but as a service that can be accessed on demand. We're used to the imagery of this particular figure of "the cloud": airy, dreamlike, light-filled scenes in which computation is a breeze (see Cramer 2013).

Yet while "the cloud" finds a certain degree of necessity in these figures of, respectively, an unknowable epistemic space and a service that is accessible as and when one needs (or can afford), they aren't the primary figure that I want to focus on here. There is a third figure of the cloud that's of particular interest to us. This figure renders "the cloud" inhabitable for a heterogeneity of users by exploiting clouds' capacity to figure indeterminacy. The institutionalisation of "the cloud" by the National Institute of

Standards and Technology didn't stop cloud computing from being a marketing buzzword; rather, it gave it new legal and fiscal purchase on procurement decisions made by the U.S. government and by companies influenced by their standard-setting role (see Mosco 2015). When Tung-Hui Hu describes the cloud as "mute piece of infrastructure" that is "just there, atmospheric and part of the environment" (2015: ix), he captures the figure's gradual transformation from vision statement to banal application with wide-reaching effects. The proliferation of "cloud"-based computing services has turned an invocatory idea into the environment in which we conduct knowledge-based work.

Let's say contemporary life takes place in "the cloud." In my home, we pay for water, gas, electricity, and internet, but we also pay for access to software like *Creative Cloud*, Adobe's suite of image editing tools, and *Evernote*, a note-taking programme, whilst also getting access to Microsoft's *Office 365* suite through our respective employers. These services, which we would once have purchased and owned and run locally on our machines, have been transformed into subscription-based services that we pay a fee to access remotely. In economic terms, this transformation represents the extension of a "rentier" model (Christophers 2020) to software: access to computational processes is often no longer secured by ownership, but must be accessed intermittently. One consequence of this transformation is that software has been further "platformised" (Poell et al. 2019; Kaldrack and Leeker 2015). While "the cloud" captures this economic transformation, it also captures the effect that changing access to computation has on contemporary life.

To do work and to engage in leisure increasingly requires access to media. The differential nature of this access refigures our relationship *to* media and, by extension, to the means by which contemporary life is lived. The relocation of software from local machine to "the cloud" has transformed not only our economic relationship to the means of work or leisure, but the "worlds" in which work and leisure can take place. Renting access to software—via subscription or, indeed, by allowing one's data to be collected and monetised—establishes specific and limited relations between users and "the cloud," understood as distributed milieu. What "the cloud" therefore captures is the imbrication of everyday life *in* media, as modulated by access to systems and services that are not only out of

our control but beyond our comprehension. But it also figures the transformation of these systems' distributed operations from "mute infrastructure" into media that *are* inhabited through multiple quotidian acts of accessing: sending and receiving, requesting and resolving, loading and reloading, streaming and buffering, refreshing and exiting. The accumulation of these (minor) figures of access in users' everyday lives images a distributed milieu. Conversely, the unequal distribution of access—to bandwidth, data, particular information, or certain media—images a milieu that's not distributed equally.

What "the cloud" arguably figures, then, is the capacity for media to constitute a milieu that can be inhabited *despite* being difficult to apprehend *as* media and as source of mediation. "The cloud" often seems a condensate of nominally opposed qualities. An abstraction that transmutes a network of computational devices and their infrastructural supports into "logical objects" that can be apprehended and acted upon (Hu 2015: x). An energy-and-water-intensive, polluting, world-spanning material infrastructure that is computation's determinate site (Cubitt et al. 2011; Hogan 2015; Velkova 2021). A triumph of marketing, recapitulating computation, once something one owned and managed, as something one can outsource and hire in when needed. A means for turning real qualities into datafiable quantities, conferring on us a "promise," as Louise Amoore puts it, that "everything can be rendered tractable, all political difficulty and uncertainty nonetheless actionable" (2020: 55; see also Franklin 2012). "The cloud" is able to articulate these nominally opposed qualities precisely because it's so all-encompassing.

This *prepositional* quality, or the capacity to figure place or environment, is crucial to what "the cloud" is and does. Conceiving of media as encompassing milieus helps us understand what's at stake in figuring large-scale computational systems as akin to a natural phenomenon. In the figure of "the cloud," old problems of representation merge with cutting-edge media technology. In his analysis of the use of clouds in Renaissance and Baroque paintings, Hubert Damisch uses the figure of the cloud that recurs in so many paintings of mythological, divine, and secular scenes over these periods to propose an idiosyncratic theory of representation. Clouds are curious figures precisely because they are an "unstable formation with no definite outline or colour," but nevertheless

possess "the powers of a material in which any kind of figure may appear and then vanish" (2002: 31). Alongside a general point about the limits of linear perspective, Damisch's analyses conceive of the cloud as a figure that "reveals only as it conceals" (61) and, in doing so, figures "the limit of representation, of what is representable" (56).

This is what "the cloud" figures today. This figure doesn't undo a distinction or show us complex relations inhabited by heterogeneous things where we once saw discrete objects—replacing the figure of the "chip," to recall Haraway's mantra one last time, with a figure of distributed computation. Rather, figures like this allow us to grasp how a distributed and heterogeneous process that is otherwise difficult to represent can nevertheless constitute one of contemporary life's integral sites. In lieu of revealing oppositions between form and matter or artifice and nature, "the cloud" condenses an-other place in which inhabitation becomes possible, turning heterogeneity into a differentially accessed—and so always partially apprehensible—milieu. Access marks out the limits of understanding traced by limits of representation. We use media and are mediated by them, without necessarily being able to make sense of, experience, or apprehend them in their totality. Or: because we're in "the cloud," our differential access to its particular services only ever gives us glimpses of it entire.

On one side, we have computational systems that shape contemporary life: platforms that are designed to deliver services and which incorporate recursive and self-optimising modes of organisation. On the other side, we have these systems as they produce effects in the world. For the users of these systems, this distinction collapses: there are services, and there is their source, "the cloud," which ultimately amount to the same thing. Rather than acting to "obfuscate" what really goes on behind our screens, Amoore argues that the genius of "the cloud" that it "render[s] perceptible and actionable (almost seeing) that which would otherwise be beyond the threshold of human vision" (41). This is Damisch's cloud logic in twenty-first-century guise: instead of *putti*, the Virgin Mary, Christ, or pillars of cloud representing the divinity, our symbology represents where the work of mediation takes place.

In "the cloud," all we can see is that we're enveloped. Or all we're given to see is that which we can access, at this time and with a given set of

resources. Pointing to the ground and declaiming that this, in fact, is where computation happens—indicating its material and/or infrastructural ground—misses the point: constituting a milieu, computation happens everywhere and nowhere. Its location is wherever it's needed to live.

Conclusion: Indeterminate Linings

Figures run over. Commenting on the proliferation of "the cloud" in technology marketing, Peters notes that though this figure may have originally been taken up "in engineering diagrams of networks," it "almost instantly took to the sky, taking selective advantage of the surplus and residue of the term" (2016: 61). "The cloud" is, amongst other things, a marketing buzzword, a technical term for computer scientists and systems engineers, a promissory invocation of a technical utopia just around the next bend in the fibre-optic cable—and, woven through each of these, a figure by which media become inhabitable in the present. As concept, "the cloud" might not hold together. But as figure, "the cloud"—with its prepositional quality and its promissory lining—is able to articulate what it means to live in and through computation precisely *because* it is indeterminate. In this case, "the cloud" has visual connotations, but they're overwritten by an epistemic function: to make computational systems apprehensible as mediate technologies constitutive of milieus that can be inhabited, differentially, as, how, when they're accessed (or rendered *accessible*).

Figures are not only inhabitable, per Haraway; they are also necessary for making sense of contemporary places of inhabitation that are shaped and conditioned by unrepresentable media-technical systems. Rather than thinking of "the cloud" as a technical conduit or a neutral container for a networked, technically mediated contemporary culture, we would do much better to think of it as more akin to what Peters calls "climate"—specific, localised, and subject, for each of us, to constant change (Peters 2015: 253-4; see also Horn 2018). In it, we have found a figure that encompasses the unrepresentability of technical systems that, in their large-scale distribution and their platformised indeterminacy, are beyond us. Earlier, I outlined this problem as one of representability, but my

argument has been that rather than operating as metaphors, figures like "the cloud" respond to the problem of representing otherwise-unrepresentable media-technical systems as milieus.

It's important to note, by way of concluding, that the example of "the cloud" that I've used to illustrate the conception of figures throughout this chapter could, equally, have been substituted for others, like portals, interfaces, platforms, networks, or data farms. As an example, questions of commensurability—that is, how unlike things are rendered comparable using metrics (Espeland and Stevens 1998; Van der Vlist 2016)—also operate by producing figures. As Caroline Gerlitz and Bernhard Rieder argue, the interface used to access a computational platform "channel[s users'] activities into predefined forms and functions" (2018: 530). They explain this process by drawing on Phillip Agre's concept of "grammars of action," which decompose the uses of computational systems into discrete actions that can be logged and counted as they are undertaken. The "grammar of action" is also a kind of figure of speech and/or arithmetic that *re*composes discrete actions as numbers. This is how computational systems figure the qualitative actions of *users* into themselves (Agre 1994). As "lively" metrics that have situated functions that are hard to extricate from their computational contexts (Gerlitz and Rieder 2018: 544), these operations also use figures to reduce complexity—only, their figures are of a numerical kind. Construed as means for making sense of how complex, distributed, and opaque media-technical systems inform, condition, and shape contemporary life, the figure finds methodological purchase in this media situation, too: we can use it to apprehend how computational systems construct a situated and contingent mode of inhabiting platforms by becoming habituated to their techniques of commensuration. This, I think, is the methodological imperative contained in figures. Let's call this operation "figuring"—understood as a method for thinking media through the figures that make their operations inhabitable.

But we end in the clouds. "Clouds," Peters says, "resist ontology" (2015: 260). Elsewhere, he also says that "[o]ntology, whatever else it is, is usually just forgotten infrastructure" (2015: 30). In the epistemological space traced by these two statements lies a conception of mediation and figuration for the present. In their complexity and their mutability, the media that constitute what we call "the cloud" aren't always amenable to

the kinds of specification promised by contemporary theory and philosophy's taste for ontological modes of theorisation, or for (new) materialism. It matters little if we point to a data centre and say that the cloud is *there*. Between how we figure it and how it figures us, though, we find atmosphere, climate, milieu, *life*—work and leisure, productivity and entertainment, self-expression and data capture. Figures rendered habitable, in other words, as media—and media rendered not just liveable, but *thinkable*, in all their complexity, by figures.

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4

Figure to Ground: Felicity Allen Interviewed by Celia Lury

Felicity Allen and Celia Lury

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The artist Felicity Allen carried out a residency as part of the research project, People Like You: Contemporary Figures of Personalisation (https://peoplelikeyou.ac.uk/). As part of this residency, she developed a new series in her practice of Dialogic Portraits. This practice is a form that evolves in series. It generates a portraiture which recognises the labour and experience of the sitter as well as that of the artist, thinking together in the context of the painting that emerges from the sitting. Allen says,

> In each series, I usually select and invite a number of people to come and sit for me, working a couple of days with each individual. As I paint them we talk and I make a minimum of two pictures. As people speak our faces constantly shift, and I often try to overlay hints of different expressions—the pictures are therefore frequently about time spent together, and the relational exchange. At the end of the sitting I invite sitters to sign the work alongside my own signature, in token recognition of their labour, although the work remains mine. Following this, I usually make a recorded discussion with each sitter, and use both recordings and pictures to produce a film or book.

For this residency, Allen invited her sitters to consider questions of traditional representation, including portraiture, as well as ideas of the digital self, and also made audio recordings with the sitters. The portraits and the recordings form the basis of a 12-minute film, *Figure to Ground—a Site Losing its System* (https://peoplelikeyou.ac.uk/portrait/). In this interview with Celia Lury, Allen addresses the significance of relations between figure and ground in her own and others' art practice.

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Celia Lury: The title of the film has all sorts of associations, relating to the understanding of a person as a figure, who stands out—or not—in relation to a ground, to who is visible and who is invisible. And, of course, it relates to perspective and projection in both visual arts and social sciences. How do you approach the notion of the figure?

Felicity Allen: Figures start off as human for me. What to do with human figures in pictures? As an 'emerging' artist in the 1980s there were considerable prohibitions on portraying figures—portraits were conservative; narrative painting represented an 'English' failed engagement with modernism, a failure to understand 'painting'; expressionism was identified with macho self-heroicising; women's bodies shouldn't be portrayed because they would always be subsumed into patriarchal consumerism.

In addition to these dictates, the 'new' media of video and photography were seen as a liberation from the reactionary representations of people associated with painting. Not only was painting necessarily reactionary, watercolour was the wrong medium for portraiture: for years the annual open exhibition at the National Portrait Gallery excluded watercolour while permitting the use of new technologies as soon as they entered the market. Photography took on the language of 'figure to ground' as a composition technique in which a subject (a figure) is positioned in relation to a ground by way of camera apertures, although I was first introduced to the term when learning about Renaissance developments in perspective.

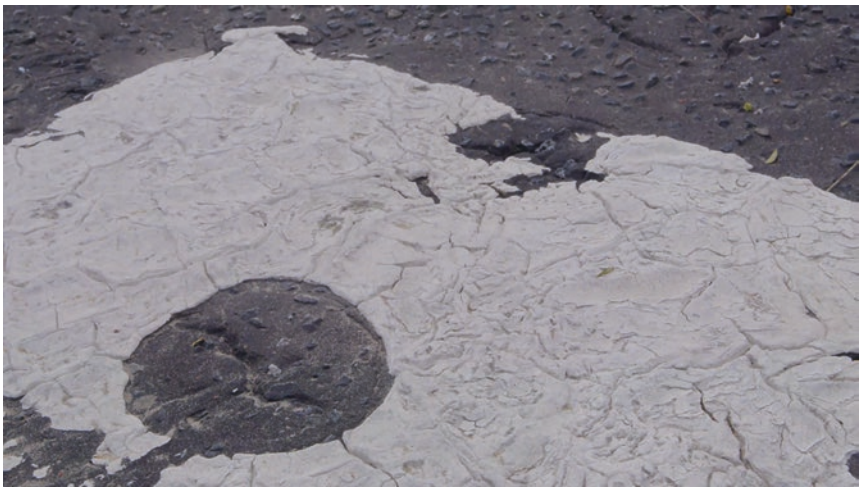
I now know that the ideas one engages with as a young person stay with one; however successfully they've been dispensed with, they're never quite despatched. They still play into my thinking about the figure in relation to the ground—the ground as figurative background, and the ground as medium. In painting one might make a representation which has a background and speak of figure to ground, but 'ground' is also the sizing treatment and base colour on the canvas, for the picture itself. In this sense the picture itself is the figure. So I have been interested in the friction of juxtaposing media apparently in argument with each other—in the 1980s black and white photos beside oil paintings, now paintings as an integral picture-making part of a film. In this sense I'm interrogating the possibilities of portraying figures against or through different types of ground, unsettling the idea that a single ground might define a figure.

CL: I'm wondering about your mixed use of the mediums of watercolour and film—including the aperture of perception each affords you as

the artist, as well as the way you mix up portrait and landscape 'page' orientations, a kind of layering of media, acknowledging their history and inter-dependence.

FA: I'd experimented with overlaying painted portraits over a film sequence in *The Disoeuvre no 1*, a film fragment I made two years ago, and knew I wanted to explore this way of working in *Figure to Ground*. I started to relate this idea to Piero della Francesca's *The Flagellation* (late 1450s), which has haunted me for decades. Through extraordinarily detailed mathematical perspective, the picture is divided into two spaces which harmoniously hang together: to the right, the foreground, with three figures in contemporary dress as if in conversation and, to the left,

a much deeper perspective, showing Pontius Pilate witnessing Christ's flagellation, one and a half millennia earlier. Carlo Ginzburg's book about the painting (*The Enigma of Piero*, 1985) shows how the architecture, including complex floor tiling, is portrayed with precise mathematical exactitude, securing the harmony.



The pandemic, and the consequent gallery closures, has reinforced the way in which our engagement with pictures and image-making is increasingly mediated through several digital layers—photography or film and then computers. In making *Figure to Ground*, I thought a lot about the way a painting is reproduced through digital media. I wanted to reveal the sense of the tactile and haptic one achieves through paint on paper, as well as the frustrations of the digital proxy: there are three digital processes between the viewer and the original picture (photography, film editing software, and digital projection or display). It was a difficult decision to include any directly filmed images of people at all in the film as I wanted to counter the assumption that film (or photography) is the real, or the true, as opposed to the subjective nature of paint. If most of the representation of people is through digitised versions of paintings, while the background—traces of a hoverport that no longer exists—is made visible in digital film, are the people real, or is the landscape? I complicate this question with the use of multiple voices along with the diegetic sounds of wind and sea as part of a composed soundscape.

I watched Black Audio Film Collective's 1986 *Handsworth Songs* again recently and was intrigued at how prescient it was in its mix of different types of image-making through film: including film of statues,

a creepy model of a clown, archive documentary film footage, and projections of black and white still photography as if hanging in a room-like space which transforms into a series of flat images overlapping each other on the diagonal. That representation of photography was very deliberately questioning truth and presentation. In the period they were making that I made a deconstructive installation of the statues in the Victoria Memorial alongside colonial tea and coffee ephemera picturing black people as servants or agricultural labourers, and I think our generation was very conscious of arguments about picture-making, public space, and visual culture. Mostly these ideas were pursued by photographers and film-makers rather than painters, but I just couldn't get along with the implements of the technology: I needed to work with the wetness of paint.

CL: The film *Figure to Ground—a Site Losing its System* seems to have a doubled approach to ground. It both locates the portraits in relation to a specific place—Ramsgate, a port in Kent that has a long history as a significant point of entry and departure to England—and suggests that the ground for our lives is disappearing, maybe even being destroyed. Is this doubled approach also a way of thinking about the changing conditions for site specificity?

FA: This is a great and perplexing question and a simple answer is, yes.

When I decided to pick up the US sculptor Robert Smithson's phrase 'a site losing its system' I was thinking of three types of sites: the site, as in a specific site and their parallel 'non-sites' elucidated by Smithson (https://holtsmithsonfoundation.org/provisional-theory-nonsites); the site as the commonly foreshortened term for a website; and sight.

The film was made throughout the first year of the Covid pandemic and, for me, virtually a year of lockdown. It was a year in which four global issues were highlighted in British politics: the treaty to take the UK out of the European Union, climate heating with the destruction of species, habitats and ecologies (implicitly connected with the global pandemic), Black Lives Matter as a global movement and the

government's military response to people seeking UK asylum. For the film I had thought I would be focussing on questions of the face, including facial recognition, but the Hong Kong demonstrations for democracy, and the use of face masks as resistance, followed by the use of face masks as protection against Covid, made this seem too topical to work with. I needed to pause in order to think, to find a way to introduce duration, if not narrative or history, into the film. The hoverport represented the fact that technologies come and go. Things do change. Nature comes back. As well as the ground shown here being a site of entry and exit, there is potential for hope in the figures the film makes visible. Perhaps it's worth looking as precisely at individual sites as at individual faces, in order to think about what you've called the changing conditions of site specificity.

All images in this chapter are film stills from Felicity Allen, *Figure to Ground—A Site Losing Its System*, Digital Film, 2021.

Sitters from Felicity Allen's Dialogic Portraits included in her film *Figure to Ground—a Site Losing its System* for People Like You: Contemporary Figures of Personalisation: Rashid Adam, Ego Ahaiwe Sowinski, Stanley Allen, Jemima Brown, Ayaan Bulale, Janice Cheddie, Abi Cooper, Luke Eastop, Jason Evans, Yael Gerson, Raga Gibreel, Althea Greenan, John Hall, Ollie Harrop, David Herd, Huang Jing-Yuan, Fiona Johnstone, Sue Jones, Sophia Lee, Zoe Lee, Lunatraktors (Clair le Couteur, Carli Jefferson), Antoine Marinot, Ruth Novaczek, Amarnah Osajivbe-Amuludun, Betsy Porritt, Kamsan Sivakumar, Salih Osman, Simon Smith, Dan Scott, Trish Scott, Gerrie van Noord, and Will Viney.

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5

The Research Persona Method: Figuring and Reconfiguring Personalised Information Flows

Liliana Bounegru, Melody Devries, and Esther Weltevrede

We live in a time of intense political polarisation worldwide, fuelled by manipulated and manipulating personalised information flows. How are these troubling kinds of personalisation accomplished? How can the dynamics of personalisation—from algorithmic recommendations to targeted advertising—be studied up close, as users might experience them? What might personalisation tell us about how troubling content travels? This chapter examines the prospects of assembling research personas as a way to obtain "critical proximity" (Latour 2005; Birkbak et al. 2015) on

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how personalisation is produced, encountered and experienced online, drawing on previous and ongoing digital methods projects on misinformation, disinformation and authenticity. In complement to research approaches that undertake larger-scale studies of personalisation at a distance through statistical and computational techniques, we examine how persona methods may enable researchers to explore, study and *figure*[1] personalisation up close through interplays and dynamics of algorithms and user features. Drawing from research that proposes that we look not only *inside* but also *across* algorithms (Ananny & Crawford 2016; see also Seaver 2017), and from digital methods approaches to repurposing "methods of the medium" (Rogers 2013), we discuss how configuring research personas can be used to study how personalisation is produced and accomplished through various actors, devices, interfaces, infrastructures, methods, techniques, user practices and data flows.

Challenges to Understanding Personalised Information Flows

Researchers have built reliable tools and curated large amounts of data to track the spread of harmful information online.[2] We can now map the spread of fake news and identify institutions, groups, individuals and bots that actively participate in mis- and disinformation on social media (Lim 2019). However, these more distant "big data" approaches tell us less about how users experience the highly personalised spaces and practices of current media environments, wherein problematic information forms and spreads. Personalised information flows aim to provoke systematised affective resonances between lived experiences, discourses, ideologies and networked logics. These resonances do not require truthfulness to work and thus render fact-checking less effective as an intervention (Devries and Brett 2021). Indeed, anyone's passionate adherence to the demonstrably false is not simply a matter of getting the wrong kind of

[1] See this volume's Introduction.

[2] See, for instance, https://digitalmethods.net/, https://publicdatalab.org/, https://digitaldemocracies.org/.

information. Instead, this devotion points to a coming together of antagonistic, highly charged responses and expressions that reflect deep societal divisions. Personalised information flows channel complex processes of identity and group formation in search for connections with "like-minded people". This widespread search for familiarity constitutes the infrastructural principle of social media platforms. Indeed, Wendy Chun (in Apprich et al. 2018) has highlighted the homophilic (from homophily: love of the same) dynamics that sustain any social media and associated recommendation algorithms that group users according to similarity along some dimension, assuming their desire for such, and exacerbate differences between groups. These dynamics are said to facilitate the emergence of "filter bubbles" (Pariser 2012), where users habitually interact primarily with users and content that share their values, likes, and preferences.[3]

However, the paths that lead to embracing mis- and disinformation via personalised information flows are not straightforward. For instance, a young, white, unemployed man engaged with white nationalist groups radically differs from a middle-class conservative woman focused on raising her children. Yet, these two individuals can end up in the same online spaces claiming that Covid-19 is a conspiracy. The shaping of personalised information flows, in other words, depends on the particular and personal lived experiences of online users, yet is homogenising nonetheless.

Our schema of the complex and contradictory processes present in personalised information flows acknowledges three interlinked elements. The first is the *algorithmic infrastructure* of personalisation on social media platforms, specifically the algorithmic curation of content for individual users based on a programmed, homophilic model that organises communities based on an assumed desire to see like-minded content. The second is the shaping of manipulation, such as mis- and disinformation discourses, by corporate and institutional actors using *data flows* to affect user interactions. Cambridge Analytica famously explained how they grouped users according to psychographics and socio-economic data (Venturini and Rogers 2019). This allowed them to target each group

[3] This notion has been empirically interrogated and challenged by media researchers (e.g. Bruns 2019).

with specific discourses concerning issues like national values and identity. The third is the triggering of *cognitive and affective responses* that tap into lived experiences. Daily streams of targeted content cultivate affective responses (such as joy, fear, paranoia and rage) over time. In turn, these triggers concretise users' identification with the narratives and realities depicted by this content (Devries 2022).

There are several challenges to undertaking a multi-layered analysis of these elements, which led us to formulate the research persona method. First, it requires reconciling two radically different analytical approaches: the "view from above" via broad structural dynamics and the tracking of information flows, and the "view from within", that is, the affective, personal experience of users. Second is the problem of obtaining data in the first place: most social media platforms are for-profit enterprises whose revenues are based on keeping and selling user data, and information about how such data is mobilised, unavailable for critical investigations.

Researchers have had to rely on reverse engineering methods, creating and repurposing data tracking tools just to glimpse automated personalisation processes. Another avenue for research into personalised information flows is through qualitative ethnographic methods such as participant observation (Hine 2008) and obtaining stream captures from real-life participants via internet panels or voluntary donations (Nechushtai and Lewis 2019; Bechmann and Nielbo 2018; Puschmann 2018). Yet, these more embedded approaches are not without issues. While they enable researchers to investigate the type of content recommended to users, they are less suited for capturing the interplay between user practices and algorithmic recommendations. And importantly, it is this interplay that provides curated content that in turn provokes actions that may shape, solidify and spark political views over time, as demonstrated in the storming of the US Capitol in January 2021, following months of intense mediated and networked propaganda centred on election fraud conspiracies.

In the context of studying personalised information flows, digital ethnographic approaches (as discussed, e.g. by Boellstorff et al. 2012) are particularly challenging not only because users inhabit multiple online cultural spaces at once, but also because it is difficult to gain trust and consent from users already distrustful of academic research (Phillips

2015). Online environments inundated by conservative or far-right talking points have historically attacked the academy and in particular have marked the social sciences as untrustworthy. This considered, research into manipulative information can be high risk for researchers. Relatedly, it can be challenging to gain the support of Research Ethics Boards for this type of research while ensuring researcher protection. The research persona answers some of these concerns in a novel way: what if, instead of looking at others as the subjects of misinformation, researchers were to take themselves as the subjects of misinformation? Rather than examining "what do they see?" through interviews or ethnographies, one can explore "what would I see?" by exploring the interplay between user practices and algorithmic recommendations to assemble a relational perspective on the dynamics of personalisation.

Situating the Persona as a Research Device

The research persona offers a way for researchers to overcome these challenges and make visible and researchable the key moments of interplay between the three elements described above: *algorithmic infrastructure*, *data flows*, and *cognitive and affective responses*. We examine how personas may be configured in digital methods research, including examples incorporating interface analysis, customised software and speculative methods. The practice of the method produces research materials that, for the reasons discussed in the previous section, would otherwise not be available for critical inquiry. At the same time, the research persona method emerges from and challenges persona-based approaches in other fields, as we discuss below.

The term "persona" has various definitions and roots in diverse fields, including theatre, literature, anthropology, sociology, cultural and media studies, design, software development and marketing. Perhaps its earliest use is as "dramatis personae" and refers to the tradition of theatre actors wearing masks to signify character types or personas, a practice that continues today. Giles (2020) identifies a key tension in this use of persona, in that it entails both the performance of the self by *individuals*, including in online settings and a set of techniques used to perform a *group or category*, such as professions (e.g. academics).

The fictitious persona is widespread in various forms of arts and entertainment (games, theatre, novels, etc.), marketing and HCI (human-computer interaction). In software development and marketing, the persona has been used to represent practices, needs, motivations and behaviours of potential users and customers into archetypes to facilitate innovation and ideation. In these contexts, personas are understood as "fictitious, specific and concrete representations of target users" (Pruitt and Adlin 2010, p. 5). UX and HCI design in particular (Tomlin 2018; Chang et al. 2008) use personas to represent *a type* of user: a singular entity that stands for a collective—that is, target audience and user groups. Similarly, marketing and advertising practices across different fields see the use of personas as tools for audience research to figure out the needs, desires and wants of different populations. In these contexts, crafting a user persona follows a particular set of steps, including extensive research about users via qualitative interviews, existing data sources, analytics, and informal or anecdotal observations (Humphrey 2017; Ricci et al. 2018).

The concept of a persona has also been a central object of study and analytical tool in new media and cultural studies. Beginning in celebrity studies (Marshall 2014), the concept of "persona" informs the study of the performance of the self by everyday social media users, micro-celebrities (Marwick 2013, 2015) and influencers (Abidin 2016), and has led to the emergence of a "persona studies" field (Marshall and Barbour 2015 and Marshall et al. 2015). Here, the use of personas helps researchers understand how media affordances configure behaviours shared by user categories. In other words, the analysis of personas and their formation involves the study not only of users but of digital objects as well: Marshall et al. argue that personas can be understood as "networks of digital objects with algorithmic components that have aesthetic and affective properties that enfold in a series of inter-objective and subjective fields of relations" (2019, p. 97).

As a method focused on processes of figuration, understood as "the activation of methodological potential in a process that is neither teleological nor mechanistic (…), but instead is a becoming-with" (Lury 2021, p. 40), the aim of the research persona is not to inform product design but to allow access to situations that enable the researcher to understand

how digital infrastructures respond to user practices and how these responses are in turn experienced by the users. The aim is to use the persona as a new media research device for studying platform personalisation and apps by locating the research amidst personalisation flows.

In the context of studying search engine personalisation, Feuz et al. (2011) have used fictitious Google accounts with carefully curated web histories to explore features of personalisation on Google Web Search. Relatedly, the walkthrough is a method for critical socio-cultural analysis of apps from a user-centred perspective (Light et al. 2018; Dieter and Tkacz 2020; Weltevrede and Jansen 2019). It invites the researcher to create a fictitious user persona to gain access to the platform features and interfaces to be studied. For example, Dieter et al. make a case for the research persona in the context of studying apps as a "methodological user surrogate, enabling access to app interfaces while facilitating heterogeneous research situations" (2019, p. 5). Notably, the notion of the "research situation" helps distinguish the research persona method from applications in other fields. For the persona to become a research device, it needs to be enlisted in and aligned with the purposes of research. How the persona is configured, that is, what decisions are made about the sites, digital objects, activities and connections that make up the persona, depends on the research question and objectives. The research persona can involve research techniques to obtain otherwise unavailable data and insights. For example, the use of personas in marketing and advertising research involves various methods to collect data about users and their characteristics, needs and situations (Caballero et al. 2014; Armstrong and Yu 1997). As well, research personas can be both automated (e.g. social bots) or directed by human actors. In social research, personas can be used to study spaces and processes that would otherwise be difficult to access. For example, ethnographers may adopt a persona when they undertake covert research (Hine 2004).

Personas are also sometimes used as a fictional device to get to the truth of a situation. The use of fictive measures as opposed to relying on already-observed facts resembles a technique used by the New Journalism movement (Hollowell 2017; Pauly 2014) in the 1960s and 1970s, and more recently in journalistic investigations such as Roberto Saviano's book on the global traffic of cocaine (2016). Here the recourse to

fictional elements and speculation inspired by imagining what must have happened aims to make a situation more real and authentic to the reader. In such deployments of the persona, imagined elements are not antithetical to understanding lived realities. Rather, as in fiction writing, it can be a resource, a speculative point from which the process of figuration takes shape. Imagining other persons is key to developing empathy and understanding of the social, economic, ideological and cultural factors that deeply influence people.

Configuring the Research Persona: Methodological Considerations

With these points in mind, we situate the research persona as methodological experimentation alongside methods taken up by design, sociology, and media studies that engage speculation as part of the research apparatus (Dunne and Raby 2013; Wilkie et al. 2015, 2017; Benjamin 2016).

More specifically, we draw on three methodological approaches. First, following digital methods principles, we acknowledge that researching digital objects, whether users, content or behaviours, requires medium-specific methods (Rogers 2013). Digital methods track the various forms digital objects take as they circulate from back-end to interface and from one platform to the next. This approach informs the creation and use of the research persona in such a way as to make possible the tracing of the various digital objects that configure it: from profile information and images to status updates, likes, location and connections with other users. It also prompts us to attend to how the platform's personalisation algorithms respond to the persona's actions and features. In turn, the research persona also enriches the digital methods repertoire. Digital methods research often focuses on public platform spaces such as pages and groups and on research approaches that cultivate the "view from above" mentioned earlier (such as through the configuration of a "research browser" which seeks to disentangle the researcher from browser histories, preferences and personalised results, or through API (application programming

interface)-based data collection). To complement these approaches, the persona offers a way to examine private and personalised user spaces, such as the news feed and other personalised recommendation spaces, as sites of user figuration.

Secondly, we take the sensibility towards the inseparability of collective and individual experiences from digital ethnography and participatory design. This means understanding the becoming of users as connected not only to the technologies surrounding them but to the actions of other users with whom they are algorithmically affiliated.

Thirdly, we draw on speculative methods (see, e.g. Wilkie et al. 2015, 2017) and performance studies (see, e.g. Madison & Hamera 2006). The research persona is a speculative device; it involves producing an artefact to prompt an algorithmic personalisation situation that is inhabited over a period of time. Our collaborators, the scholars and artists Ioana Juncan and Alexandra Juhasz, pointed us towards character-building techniques from theatre practice to create such an artefact, such as those taught by Elmo Terry-Morgan at Brown University.[4] These techniques, which encourage the research team to collectively imagine the persona's background and life story, significant life events and relations, as well as how they look, speak and think in their everyday life, evoke empathy within the researcher for an individual who might be situated amongst these flows in daily life, and are crucial to thinking through how a particular person would react to different types of content and affective charges.[5] From this position of the speculative user experiencing personalisation, researchers can investigate and problematise the work that algorithmic recommendation systems do as part of manipulative information flows. This lends insight into the effectiveness (or lack thereof) of flows of mis- and disinformation. It is also an inventive device in its experimental, modifiable and situation-specific approach (Lury and Wakeford 2012) to making visible, researchable and accountable the social and technological processes that integrate manipulative personalised information flows.

[4] https://www.brown.edu/academics/theatre-arts-performance-studies/elmo-terry-morgan

[5] For more details on the fictional persona construction exercise run by Ioana Juncan and Alexandra Juhasz as part of the project The Research Persona as Digital Method, see https://wiki.digitalmethods.net/Dmi/SummerSchool2019ResearchPersonaAsDigitalMethod.

Three Examples of Research Personas

To become a research device, the persona needs to be aligned with a research apparatus containing questions, objectives, research angles, analytical lenses and a particular narrative style (Marres and Gerlitz 2016). Furthermore, the configuration of the research persona takes on different forms depending on the research questions. In this section, we explore three ways of configuring research personas to address different lines of inquiry, as summarised in Table 5.1.

To further explain this, let's go back to how an online user is perceived by different layers of digital networked media. From the perspective of

Table 5.1 Three examples of how research personas can be configured

	Interface persona	Infrastructure and algorithmic persona	Speculative persona
Research aim	To examine platform-specific features and methods of personalisation (e.g. registration, data fields and analytics).	To trace the back-end circulation of user data across platforms.	To examine the interplay between user actions and content recommendations on the platform/app frontend.
How is the aim addressed	By assembling user personas informed by examination of platform affordances and use cultures.	By assembling app user personas and using software tracking tools to examine back-end data circulation prompted by the persona's use of an app.	By assembling user personas informed by character-building techniques from theatre practice, as well as recording content recommendations and collectively imagining the personas' responses.
Example	Studying affordances and cultures of persona formation on Facebook.	Studying back-end user data flows on dating apps.	Studying personalised information flows on Reddit.

the infrastructure, which involves networks linking together platforms, apps, data trackers and so on, the user is a source of data. This data is provided by the user (e.g. login, likes, comments, posts or banking information), as well as derived from monitoring and stored information (e.g. device used, quality of connection, location of connection, credit rating information or connection time). The infrastructure, in turn, can be used to aggregate data flows, not only to group users together but also to link diverse data about the same user on different platforms, apps and sites, so that, for example, buying patterns on one website become part of the personalisation process on a social media platform. At the back-end infrastructure that hosts these informational ecosystems, the kind of persona that needs to be developed is what we call an *infrastructure and algorithmic persona*. This particular type of research persona is designed to be recognised by a system (e.g. an app or a social media platform) that tracks the persona across platforms, websites, apps and so on.

In one of our research projects, we used research personas alongside software tracking tools to follow the circulation of user data on different networks and platforms via apps.[6] We focused on dating and gaming apps to capture "app events", such as the processes by which two users are matched with each other or swiping an advertisement in dating apps to capture the data connections that are established in the back-end. In this particular research project, we paid attention to tracking the data emanating from the device (in this case, a smartphone) that our persona was using. We created two research personas and experimented with the level of profile detail necessary to orchestrate a match between our research personas. Sketching out broad partner interests and restricting the geographical proximity proved enough detail to facilitate the match. Furthermore, to ensure that our research personas are not accidentally conflated with existing dating app users, we ensured that the personas were unique: we avoided generic names, as well as first name and last name combinations that already existed. However, the socially meaningful event of the match is a data-poor moment in the back-end of dating apps, which becomes apparent when compared to the app event of swiping an advertisement (Fig. 5.1). To trigger advertisements on dating apps,

[6] https://wiki.digitalmethods.net/Dmi/SummerSchool2019ResearchPersonaAsDigitalMethod

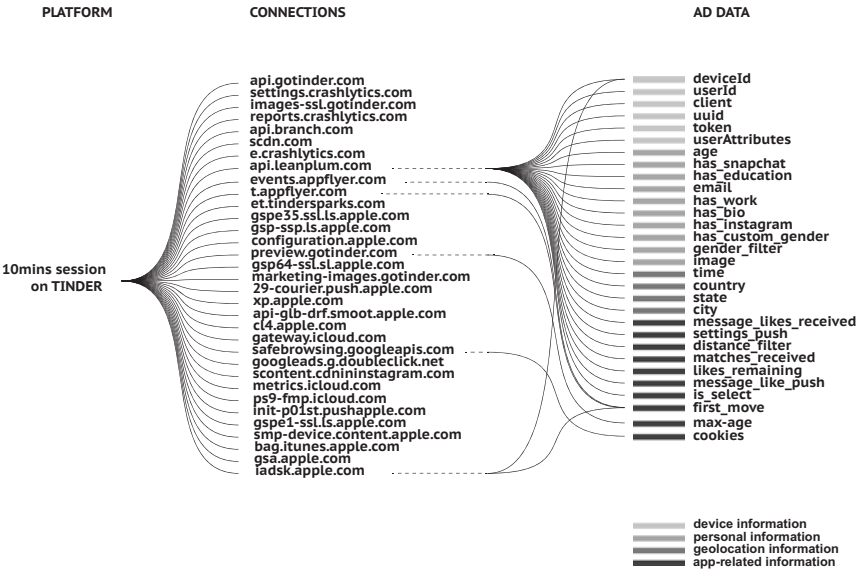

Fig. 5.1 The app event of swiping an ad: Data shared with ad networks using Tinder. Visualisation by Alice Ziantoni and Noemi Schiavi (Density Design), Digital Methods Summer School 2019

we experimented with how much profile detail, user activity and account connectivity is required. Installing a dating app and logging in with a new research persona account on one of our personal phones immediately triggered ads in the dating app. In contrast, none appeared on a clean research phone, signalling the relevance of the embeddedness of the research persona account in an active device and connected media ecosystem. Compared to the match, swiping an ad is a data-rich app event that allows us to further define the roles of apps within the networked economy as brokers of user data (Weltevrede and Jansen 2019). These initial explorations suggest that app events are multifaceted and simultaneously become manifest and meaningful on the user frontend and the app/server back-end in different figurations.

The user takes on a different form from the perspective of the digital user interface. Here, instead of data, what is perceived is a series of media objects: profile and other pictures, for instance, name, content creation and reactions (via like buttons, for example) to other content and users.

The use of *the interface persona* brings to the fore the choices made in how a person presents themselves. The aim is to better understand affordances and cultures of persona formation across different platforms. This includes the kinds of platforms and apps they typically would use and for what purposes, the types of vernacular modes of expression they would use depending on their particular ways of being, and the kinds of communities they would want to belong to. Here, it is the construction of the persona as an everyday user in the frontend interface that becomes the central focus of analysis. It requires that the researchers review several user profiles to get a sense of how people act within specific online communities, depending on their biographical details.

Research Protocol on Interface Personas from Digital Methods Summer School 2019

What is the data space of persona-making according to different platforms, devices, infrastructures and media spaces?

Considerations

- What are the data fields and categories which are available to advertisers and others who use platform data?
- How are persons rendered legible and intelligible using data?
- What are the data fields which are available to users when they sign up and use a platform?
- What insights from autoethnography and walkthroughs could be relevant for the creation of a research persona?
- How are data spaces of persona-making organised across platforms, advertisers and other actors?

Protocol

- Select a platform or device (e.g. Instagram, Facebook, Twitter)
- Map/list data fields/flows that make up the user
  - *This could be based on the qualitative analysis of platform interfaces (including the advertising interfaces), platform APIs and data, documentation, third-party platform features, etc.*

The interface persona, which borrows heavily from the walkthrough method and UX design, does not involve the persona interacting with other (non-fictional) users. Rather, it is used as a device to attend to how platform features and cultural practices are involved in personalisation. We see this approach as particularly useful for setting up coding schemas to analyse, for instance, modes of engagement and the rise of new vernacular language and practices. This approach allows the researcher to focus on user engagement with content and the kinds of community building that emerges from such interaction. Critically as well, the interface persona pushes beyond questions of content in mis- and disinformation towards questions of community practices and values and how trust is built among users.

The third kind of research persona is the *speculative persona*. This involves the creation of a complex character to attend to the different affective resonances that media objects, such as a fake news article or a politically biased meme, can have with users, and how this, in turn, cultivates and strengthens specific modes of action, from voting choices to participating in demonstrations and illegal activities. The speculative persona has a unique name and a face (e.g. generated via AI), and a rich and detailed biography.

The speculative persona design is a collaborative process among researchers, with one of the purposes of the collaboration to bring to the fore and challenge researchers' preconceptions and assumptions. Our collaborators designed a persona on personalised misinformation flows in the Canadian context who was a young 22-year-old white man living in a post-industrial city in Ontario (see Neville and Langlois 2021). The research group worked against creating a stereotype by including precise details about the character to develop a life story representing the potential features that might affect detailed personalisation flows that rely on emotions like aggrievement, entitlement or economic frustration. For example, they imagined the character as having grown up watching the status of one's middle-class parents disappear and frustrated by liberal politicians. Actively borrowing from theatre techniques, the researchers created a persona that they could relate to and empathise with rather than a device or stereotypical model to get at data. Inventing life details was key to identifying the persona's worldview regarding both interpersonal relationships and interest in

specific political and social issues. Deep consideration of how the persona thought of himself, what kind of hobbies he engaged in and the kinds of relationships he was pursuing further helped create a rich character. In the end, the character was derived from both sociological knowledge (e.g. available studies and media reports) and personal knowledge (e.g. friends and family members who had developed far-right tendencies or who had similar life experiences) on the part of the research group.

Once constructed, researchers then activated the persona on two platforms that corresponded to his profile—Facebook and Reddit—and subscribed the persona to a range of subreddits (from relationship advice to gaming to conservative and alt-right politics) as well as Facebook groups dealing with local politics. During weekly sessions, they recorded the recommended content for their persona on these two platforms, and as a group, discussed how the persona would react to different recommendations and why. This made it possible to understand the content, style and tone the persona would adopt in interactions with platform content. By liking some of the content, they were further able to see what kinds of recommendations were algorithmically provided. In so doing, they paid attention to how mis- and disinformation content can be tailored in many different ways, not only through different media forms but also through different rhetorical styles (e.g. passionate vs pseudo-scientific).

In sum, the speculative persona enables the researcher to gain perspectives and insights into how algorithmically mediated content may be encountered and experienced. It serves as a space where researchers may feel and imagine how the persona is touched, provoked, angered or saddened by online content. It also enables speculative understanding about how manipulative personalised information flows cultivate (pre)conscious affective responses and, as much as possible, alternative ways of understanding the world.

What the Research Persona Opens Up

As discussed previously, the persona method allows researchers to capture flows of information that work to configure the experience of individual users who interact with various content online. Unless we

use autoethnographic techniques, these flows interacting with users—whether algorithmic recommendations, media objects or images, or emotional comments—and users' affective responses to them are typically challenging to study. Using the research persona allows the researcher to enter a manufactured political positionality similar to (but not equivalent to) the situated experience of a user belonging to a particular community. This allows the researcher to experience similar flows of information and media objects as everyday users as they sit and interact amongst them. While this positionality does not enable us to address the question of how an actual user or certain demographic sees and responds to content, it does open up the possibility of exploring what platforms show in relation to what users do, that is, the dynamics that emerge between user practices and algorithmic recommendations in experimental settings. In this setting, the researcher's experience itself becomes the object of analysis, as opposed to the data or responses of others online. In this sense, the research persona can be considered a method that sources its findings from embodied processes that happen at the level of the researcher themselves, as they find themselves encountering content, triggering data output and responding in various affective ways (confusion, intrigue, anger, excitement, etc.).

In other words, the research persona is not meant to further a researcher's interpretation of a subcultural space or represent that space through description. This is because a cultivated positionality cannot be said to *represent* the experiences of other users in hypothetically similar online/political positions. While the persona builds on observed knowledge of online political trends (Haseman 2006; Snyder-Young 2010; Elliot 2017), its primary source of knowledge is the experience of the researcher themselves as they situate themselves within digital networks and record their embodied experience, from sights and semiotic interpretations to affective responses. Because of this, the research persona can be considered to follow other experimental and performative-ethnographic methods that change the relationship between the researcher and the researched (Pollock 2006). Here, the research persona no longer marks the researcher as "subject" and the interlocutor as "object of study." Instead of existing as separate entities, the research persona turns the researcher's embodied, interactive experience with information flows and other digital actors

(homophilic networks, texts and images, and haptic platform features) into both the one who studies and the one who is studied. Through this recursive approach, the research persona allows the researcher to encounter and thus map specific interactive moments between themself and the digital figures and entities surrounding them, effectively bringing to the fore the figuration work of automated data exchanges, taken-for-granted communicative affordances, and (pre)conscious habits and reactions that previously avoided critical analysis.

While the research persona borrows some techniques from covert research, it modifies these in significant ways to reflect the diverging goals that it serves. Whereas covert research methods in sociological or anthropological studies have seen the researcher take on a fake identity to gain access to hard to reach or precarious social spaces (Calvey 2008), such as underground drug-distribution networks or Neo-Nazi organisations (Shoshan 2016), the persona method is not being used to study particular social groups. Rather, the persona method examines the dynamics that emerge between algorithms, platform infrastructures and users. Performing a fictitious identity in relation to the studied groups is essential in this process. In contrast to this, concealing the identity and aims of the account is not a necessary condition of research when using the persona method since the purpose is not to study particular groups of users (as is often the case with covert research). Instead, the interest is in observing the responses of the medium, both on the front end (e.g. in terms of content recommendations) and on the back-end (e.g. in terms of data exchanges). Different options are thus available to the researcher using this method. The researcher may opt to make the persona account public, ensuring that its fictional character and its research purpose are clearly stated in the user profile, and perhaps including a webpage that provides more information about the project and a means by which the researchers can be contacted for more information by users. The researcher may also opt for a private account whose profile and activities are not visible to other platform users and respond only to accounts that were not linked to specific individuals. While the latter option may minimise the possibility of users initiating interactions with the research account, this decision may also shape information flows in ways that inspire further investigation. In either case, as Light et al. (2018) suggest, what is

important is that the researcher devises strategies for responding to potential interaction attempts from other accounts to ensure not only that harm is avoided but also that relations cultivate care, empathy and mutuality as much as possible (see, e.g. Tiidenberg 2020).

While being reflexive in their analysis, in covert research, the researcher does not include or feature themselves as the primary object of study. Rather, the majority of their data is sourced from the behaviours or conversations of their interlocutors. Covert research is classified as such when there is information withheld from interlocutors to gain access to information or data provided by such interlocutors (Calvey 2008). Since the object of study in the research persona method is the dynamics of personalisation, this method is more appropriately qualified as a performative or inventive approach to evoking findings (e.g. Culhane 2017) than a covert study of given individuals or groups.

Regardless of these distinctions, the method raises important ethical and legal challenges which require thorough consideration. While the precise configuration of legal and ethical considerations to accompany the use of this method depends on the purpose of the research, and the legal frameworks in place, a set of concerns demand attention. First, while our application of the research persona avoids interactions with individual personal user accounts, the use of the persona nevertheless implies participation in the platform and particular forms of interaction. For example, to cultivate an algorithmically curated environment for the researcher to experience, the persona may interact with public platform content by, for example, clicking on news articles or blog posts and following public pages. These actions are recorded by the platform and made available via its various interfaces, including being visible to users. In designing research with personas, it is important to consider how these actions may be experienced as misleading or construed as deceptive and possible harms that could arise as a result. Ethics boards in different countries and research guidelines in different disciplines may have differing understandings of research involving these techniques. Some may see the use of some of the techniques described above as *de facto* leading to covert research and recommend that researchers carefully broach this question when designing their research projects. We recommend in

particular that in approaching ethics boards, researchers give careful consideration to unintended consequences and harms.

The process of generating and maintaining a research persona also raises other questions regarding ethical research, given its resemblance to tactics used by marketing research. Similar to the above examples of covert ethnographic work, marketing research tends to use the construction of a fake or covert profile to gain information about other users—recording their likes, the nature of interactions or personal networks. In contrast, the research persona uses the embodied experience of the user-researcher to provide a nuanced examination of the particular networked positionality cultivated by the research persona's interactions. In this sense, the research persona also differs from previously discussed marketing tactics' use of personas to typify and gather information about other users. While the persona has previously been used as a device to *know persons*—whether through understanding customer needs, more precise segmentation for marketing, to ensure that users are better catered for by-products and services or to gain access to social spaces and communities—we are interested in how it may be repurposed as a device to *understand personalisation*, including the role that platforms, data and algorithms play in shaping contemporary sociality and in producing (sometimes troubling) associative spaces and dynamics.

While research personas may offer fresh perspectives and promising lines of inquiry for new media research, they should be used carefully, not just in compliance with relevant legal and ethical rules, but with consideration of other persons, communities and users as a central concern in the research process. Creating one or two new profiles on large platforms such as Facebook and Reddit—each with millions of users and filled with fake and empty accounts—to study algorithmic personalisation may be less troublesome than using them in smaller groups or more intimate settings. Given that fake and fabricated accounts are now widely studied, one would not want to inadvertently or unthinkingly contribute to proliferating the problem. In line with recent approaches to ethics in internet research, we advocate an ethic of care regarding the specific circumstances and communities that may be affected by the use of such techniques (Tiidenberg 2020).

Apart from these concerns, the use of personas may not conform to some of the terms and conditions of platforms or apps like Facebook, which have attempted to mandate the use of online profiles. Such platform practice itself (such as Facebook's 'real name' policy) is deemed unethical by many advocates (Haimson and Hoffmann 2016). In practice, many users have multiple Facebook accounts and aliases for various legitimate reasons, such as further security from trolls, differentiating between work and personal spheres, or building new family and friend networks. Not complying with platform terms of use is an object of ongoing debate in internet research (see, e.g. Tiidenberg 2020; Marres 2017). The extent that this provides an ethical dilemma is currently the topic of public and academic debates that weigh the need for public scrutiny of large platforms like Facebook in the context of the problematic effects of personalised information flows and unbridled data-mining rights held by such platforms (see, e.g. Rieder and Hofmann 2020).[7] Indeed, much essential research into platform and algorithmic bias requires methodological approaches that would be considered to not comply with legal terms of platforms, and yet may often be sanctioned by ethical review boards and peer review procedures due to its potential contributions to the public good (see, e.g. Eriksson et al. 2018; Sandvig et al. 2016). This point is also raised by Marres (2017), who argues that the preoccupation with compliance with terms of service of platforms whose own functioning often raises ethical problems, may distract from the imperative of interrogating the problematic role of these platforms in reconfiguring collective life, which would bring additional ethical problems.

As an inventive approach (Lury and Wakeford 2012; Elliot & Culhane 2017), the research persona is a re-imagined way of using the researcher's

[7] For more detail, see in particular the Association of Internet Researchers Ethical Guidelines 3.0 that further delves into how platforms' terms and conditions are being fought against by the American Civil Liberties Union: https://aoir.org/reports/ethics3.pdf. Also see *Spotify Teardown* (2019) for an account of the ethical and legal struggles over corporate terms of use. Christian Sandvig in the US recently won a lawsuit that violating a website's terms of service does not violate the Computer Fraud and Abuse Act (https://www.eff.org/fr/deeplinks/2020/04/federal-judge-rules-it-not-crime-violate-websites-terms-service).

positionality to open up space for conceptualising and mapping the processes of figuration and subjectivation that occur through digital flows of information and content across social media. Given its creative and performative features, we propose that the persona method be combined with participatory arts and design practices, such as material artefact and prototype design, co-design workshops, creative writing and situated performing arts. Deployed in these contexts, the research persona can act as an "elicitation device" (Marres 2017; see also Lezaun and Soneryd 2007) that prompts engagement, debate, collective learning and empathetic imagination.

An example of this can be found in the interactive online theatre show *Left and Right, or Being Who/Where You Are*, directed by Ioana Jucan (2021). This digital theatre performance developed an experimental and participatory process where actors situated themselves in the worldview of various politically charged characters. These characters were inspired from other types of qualitative online observation, but their development into unique characters emerged from the actors' use of the persona method; actors engaged in interactions with their online and offline environment to cultivate an embodied experience that could inform their character development. Apart from insights provided to researcher/performers, uptake of the research persona in this setting also provokes the audience to think of political identities not as static or unalterable but rather as figurations resulting from relational, embodied processes that occur over time and with technology through interactions. Notably, this kind of use of the researcher's positionality as both investigator and situated participant to produce theatrical insights is not without precedent and is part of new creative ways of presenting and thinking through embodied experience and performance (see *Performing*, Kazubowski-Houston 2017).

In the end, revealing the processes of configuration that shape users online via interactions with information flows is the key insight developed by the persona method; how these processes are explored or communicated either through writing, performance or other creative methods is a flexible enterprise.

Conclusion

The research persona is a means of figuring the co-construction of user experiences and behaviour at different levels of mediation, from back-end to interface to embodied experience. There is a definite artificiality to the figuring process that the persona approach opens up as it creates experimental situations. These situations may be envisaged as experimental sites through which data flows, and where algorithmic processes and other personalisation systems and affective resonances can come to the fore. This artificiality thus opens modes of inquiry into spaces and dynamics that would not be possible to analyse otherwise. In that regard, the persona is both a research method—a way to set up situations where experiments and analysis can happen at all three levels of information infrastructure, interface and subjectivation—and an object of research. Its core feature is its refusal to set up critical distance, allowing reflection on the relationality between researchers, those being researched and the platforms that participate in and enable these interactions. Only by constructing modes of encounter, even if starting with the imaginary as an entry point, can we start figuring out how to reinvest in digitally mediated social relationships and formulate principles for new types of personalised information flows.

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6

Engines, Puppets, Promises: The Figurations of Configuration Management

Matt Spencer

Introduction

The imagination of machines as human-like and of humans as machine-like has been a central facet of modern Western technical culture, most prominent in the kind of "thinking" computers do and the kind of "computing" that human brains do, but also spanning analogies between capacities for decisions, rationality and control or self-regulation. Arguing that metaphors, analogies and images, far from being mere poetic decoration, run deep in reasoning and in how the world thus becomes organised, one of the animating agendas of critical studies of technology has been a search for "a deeper, broader, and more open scientific literacy" (Haraway 1997: 11), for a more metaphorically aware "critical technical practice" (Agre 1997), and for spaces to intervene in the cultural imaginaries of technoscience (Suchman 2007: 227).

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The well-worn opposition of the "real" versus the "merely metaphorical" beckons, however. As does that of "figural" and the "literal." For Agre, Haraway and Suchman, these oppositions did important work in challenging realisms, opening out technical culture to critique, and in Haraway's case, examining the terms in which Western culture imagines the real in the first place. In this chapter, however, I want to explore the value of another contrast. If we understand "figurations" in Haraway's words, as "performative images that can be inhabited" (Haraway 1997: 11), we might contrast figurations with instrumental metaphors, the latter less a matter of habitation, and more one of associations available for use.

Writing from a field almost entirely disconnected with that of Haraway, Daniel Dennett argued that the apprehension of something (be it person, animal or machine) as an agent with intentions and reasons of its own is itself a finely tuned and adaptive trick, this "intentional stance" an acquired technique for living a life in common with others (Dennett 1989). This provides one reading of what Haraway refers to as the "tropic quality of all material-semiotic processes" (Haraway 1997: 11). Seeing others is always a "seeing as," then, and more direct than an intellectual equivalence; in Kukla's reading at least, a *stance* is to be understood practically, as "a way of readying your body for action and worldly engagement" (Kukla 2017: 4). Figurations understood as stances rather than associations, would be just such "ways of readying," constitutive of relations to others.

Dennett also described a "design stance," sitting somewhere between the intentional and the physical, a mode of interpretation that sees something as embodying a purpose, a normativity: that which it is there for, an embodied intention, its history coupled up to its behaviour according to what it is *supposed* to do (Millikan 2000). Crucially, for Dennett, these stances *are themselves designed*, indices however not of a master creator, but of the long and blind process of evolution. The result: the installation of pragmatic instincts that enable animals like us *to both cope in and create* a world of social and technical complexity. Such entanglement of figurations in species history further distinguishes them from the metaphors we use. The emergence of tool use and complex sociality are part of the same story as the emergence of the forms of worldly engagement according to which some beings are approached as intentional or purposeful, setting others in relief as things.

My interest in this chapter concerns the circumstances in which what counts as an intentional agent are reconfigured, the ongoing and unfinished history of technology-human entanglement. I look to a domain largely invisible to critical studies of technology: that of configuration management. In the 1990s, growing complexity of computing environments led to the relations between configuration managers and the systems under their stewardship being called into question. I examine "Promise Theory," a philosophy emerging from configuration management which treats computers as intentional agents. Promise Theory has been ignored by the social sciences, but its circumstances of origin are very familiar: the heterogeneous infrastructures of scientific computing of the early 1990s, circumstances that also inspired Susan Leigh Star's widely influential relational approach to infrastructure. The common origins are revealing, as are common concerns with locality and distributedness. In reformulating relations with machines, metaphors of course abound, of puppets, engines, immune systems, orchestras. But we can also, I suggest, detect figurational shifts, re(con)figurations, shifts in forms of worldly engagement such that "things making promises" is more than a manner of speaking, a form of stewardship of distributed systems.

Figuring Configuration Management

Configuration management originated as a set of techniques developed in support of systems engineering, pioneered in the 1950s by NASA, in order to keep track, make manageable and make auditable the vast swathes of stipulations that accompany complex technical systems, asserting how they should be set up, the states their component parts ought to be in, dependencies that should be present, the versions that ought to be used, settings that should be set, switches flicked and plugs plugged (Watts 2011: 10). A vast exercise in paperwork (nowadays usually virtualised in configuration management databases) which is essential to the smooth running of innumerable infrastructures and platforms, yet which almost never surfaces into wider awareness. An infrastructure's infrastructure, if there were such a thing.

In the 1990s, configuration management in information technology made a subtle but significant departure from this broader tradition,

associated with the transformative effects of automation. A new kind of configuration management tool appeared for managing the configuration of networked computer systems, which would systematically check whether systems under its stewardship conform to "policy" (the officially recorded configuration) and take remedial action to fix discrepancies. With automated apparatuses serving as their eyes and hands, systems administrators became the designers and operators of sophisticated automation infrastructures.

The first widely used automated configuration management tool was CFEngine. It was developed in the early 1990s by Mark Burgess, a theoretical physicist working at the University of Oslo. He released the software open source in 1993, and by the late 1990s it had become by far the most widely used tool of its kind. Over the next two decades CFEngine went on to serve as archetype for a class of tools that would redefine the nature of configuration management in information technology. These would later include Puppet (released in 2005), Chef (released in 2009) and Ansible (released in 2012). The early success of CFEngine drew Burgess away from physics and into the world of systems administration, and he continued to develop the software alongside a theory of configuration management in the years that followed.

As a postdoctoral scientist, one of Burgess' duties had been the administration of his research group's network of computers. This was a classic situation of, to use the unwieldy catchphrase of the time, heterogeneous distributed computing: the kinds of machine used in research had a wide range of configurations, versions of software, permissions associated with user accounts, file system structures, scheduling of batch processing, and so on, often different models of device, typically running variants of UNIX.

Facing the challenge of managing such heterogeneity, Burgess looked to apply automation to the tasks of configuration management. The standard approach of the time involved curating custom procedural scripts. The activities a system administrator would otherwise carry out manually would be written as step-by-step algorithms that could be executed from a privileged centre of control. This "imperative approach to thinking" (Burgess 2015b: 2) turned out to be fragile. The diversity of computing environments made these scripts complex in their own right, unwieldy to maintain and "brittle," tending to produce unpredictable results,

especially when run against a machine in an unknown state (Spencer 2015). Luke Kanies, who would later author Puppet, dubbed the challenge of maintaining assumptions a problem of "software rot" (Kanies 2003: 119). Burgess, on the other hand, interpreted the problem as a physical one, the idea that in an unpredictable world, commanded systems will tend to diverge from a known starting point (Burgess 2015b: 4).

So CFEngine moved away from procedural scripting. It was based instead on a declarative approach. The desired configuration is stated in a special syntax, without stipulating what to do, how to check, enforce, or make a repair in relation to it. A set of CFEngine's specialised "software agents" would then interpret and compare this "policy" against the observed state of various computers and generate contextually specific steps for remedial action if necessary. The activities of these autonomous agents were not intended to fix problems as a one-off complete repair. Rather, they were intended to run in the background in a decentralised fashion, producing over time a *convergence* between the actual and the proper state of affairs.

This combination of declarative policy, decentralised automation and convergent repair became the paradigm for IT configuration management and with huge impact beyond. The automation of configuration is, for instance, the heart of cloud computing. Over the last two and a half decades, the paradigm expanded to provide comprehensive infrastructure automation, so much so that configuration management tooling exceeded its original purpose. Beyond just checking and repairing systems that already existed, tools like CFEngine also provide the means to spin up new infrastructure on demand, declaring it into existence, as it were. "With CFEngine," an Automation Engineer at LinkedIn is quoted as saying, "I can define a new Software Defined Datacenter and offer IAAS [infrastructure as a service] and PAAS [platform as a service] to my customers within 10 minutes" (CFEngine n.d.: 3). The infrastructure of infrastructure indeed!

The automation pioneered by the configuration managers paved the way for wider suites of tooling, which brought automation to code management, release pipelines, build processes, testing cycles and deployment. Together these tools became the technical foundation for agile and continuous delivery-based methodologies, which in turn transformed the manner in which functionality is delivered in digital environments,

taking us from the "old approach" of delivering new versions of applications after long periods of stasis, to the current paradigm involving constant flows of small iterative changes (Humble and Farley's textbook *Continuous Delivery* being the enduring reference point for the new technical foundation; 2010). When Neff and Stark described the agile approach as "permanently beta" back in 2004, they saw it as an approach to design (2004). With the rise of automation and cloud infrastructure in the years that followed, however, we can now say it has expanded significantly in reach, an approach to the whole delivery lifecycle: not just design but also delivery and the operation and management of the systems that result.

It is testimony to the depth at which configuration management is embedded that it has escaped attention of critical studies of technology even in cases where they address cloud computing square on. Peters, for example, takes a user-centred view, associating cloud computing with cloud storage (Peters 2015). Hu and Bratton go in the opposite direction, with their focus on the evolution of physical infrastructures, a broad story of communication networks and datacentres, without addressing the question, missing in the middle, of the techniques by which it has become possible to tame that complexity (Hu 2015; Bratton 2016). Amoore similarly examines analytics and algorithms in light of material infrastructure, but leaves little space for understanding the "how" that makes these techniques possible (Amoore 2020). None of these thinkers appreciates the problematic of machinic autonomy that underlay the ability to craft self-regulating, automatically provisioning systems for computational infrastructures, and which is now intimately woven with digital culture.

Smart Intentional Infrastructure

Automating configuration management was not simply a matter of finding clever ways to script manual tasks. It required and fostered reinterpretation of the problem of configuration itself, which became a topic of debate and discussion among an emerging community of IT configuration managers, on mailing lists and at conferences. For Burgess, this intellectual project led towards the development of a theory of cooperation he

called "Promise Theory." Promise Theory arose out of Burgess' attempts to formulate what it was he had been trying to do with CFEngine and became over the years a lot more than a theory of configuration.

Moving from the context of theoretical physics into the professional community of system administration, Burgess reports that he encountered a set of intuitions about computers that seemed to be aligned with the procedural scripting approach to configuration management. This idea, that computers were like obedient rule followers, rubbed awkwardly against his more physical, more cybernetically inflected intuitions. Writing about his experience at the conference in Large Installation System Administration (LISA) in 1997, Burgess relates that

> To me, the work I presented was just a small detail in a larger and more exciting discussion to make computer systems self-governing, as if they were as ordinary a part of our infrastructure as the self-regulating ventilation systems. The trouble was, no one was having this discussion … In the world of computers, people still believed that you simply tell computers what to do, and, because they are just machines, they must obey. (Burgess 2015a: 4)

Though first by its name an "engine," when he returned for the following year's LISA, Burgess had armed himself with a new metaphor to cut through these preconceptions. His talk, published as "Computer Immunology," went on to be influential in the field. It used the metaphor of an organism and its immune system to perturb system administration thinking away from its familiar notion of the obedient computer. "CFEngine," he wrote,

> fulfills two roles in the scheme of automation. On the one hand it is an immediate tool for building expert systems to deal with large scale configuration, steered and controlled by humans. It simplifies a very immediate problem, namely how to fix the configuration of large numbers of systems on a heterogeneous network with an arbitrary amount of variety in the configuration. On the other hand, cfengine is also a significant component in the proposed immunity scheme. It is a phagocyte which can perform garbage collection; it is a drone which can repair damage and build systematic structures. (1998: 287).

The proper behaviour of cells which sustains the life of an organism is not enforced by their strict obedience to commands. While almost all cells do have a catalogue of instructions, some may have faulty DNA, something might go wrong in the reading, or a foreign agent may be interfering with the normal processes of interpretation. The immune system is comprised of mechanisms capable of detecting and responding to aberrant behaviour, keeping things healthy at a higher level of organisation. Similarly, CFEngine is built on scepticism that commands can be sufficient to ensure convergence: machines may have missed instructions, might end up with multiple conflicting instructions or might be missing dependencies for carrying them out. Instead, it implemented a set of autonomous agents capable of identifying problems, making remedial changes or bringing issues to the attention of the administrator.

Later reflecting on this period of time, Burgess notes that he soon abandoned the immune metaphor in favour of a theory of promises based on the figuration of computers as intentional agents.

> The idea gelled in April of 2004 that autonomously specified declarations of intent were simply promises--something conceptually opposite to obligations, or any other kind of declarative or imperative logic. Promises could be defined as a network that was not necessarily the physical network between computers, more like a network of self-imposed constraints that we call intentions … Emerging was a theoretical model for a kind of smart, intentional infrastructure based on graphs of autonomously made promises. This graph theoretical approach was an altogether more plausible and scalable approach to locality than deontic logic. (Burgess 2015a: 247)

Burgess maintained the contrast with imperative thinking within the theory of promises: "obligations" can be understood as a special case, as promises made for others, fragile in comparison with promises one makes for one's self. This lexicon was implemented in CFEngine's third version: policy was to be understood and encoded in terms of the promises that machines or systems make (to one another, and to users). And in addition to developing CFEngine, Burgess also built out this theory, developing it into a graph theoretical framework for the analysis and design of intentional relationships in distributed systems, in collaboration with Jan Bergstra, a Dutch computer scientist.

To translate into more familiar sociological terms, promises formalise the normativities of technical systems: what it is that they are *supposed to do*. But instead of using the design stance, Promise Theory construes technical normativities via the intentional stance. They are treated as a thing's intentions rather than purposes that can be read into it. This shift between stances is strategic: the problem with addressing technical normativity via the design stance is that it is too easy to regard the purposes of designed things as residing in the mind of their creator, or else in some separate source of authority, such as the configuration management database. By locating the source of normativity outside of the technical thing, the problem of configuration management seems to be, indeed, one of imposing the correct behaviour on subservient infrastructure via obligations. The language Burgess and Bergstra deploy, however, in formulating things' "autonomously made promises" affords things a depth of their own, enabling us to see their purposes as their own, as local to them. This localism is central. Promise Theory, they write, "is a relativistic theory of 'many worlds' belonging to its many agents" (Bergstra and Burgess 2019: 4). Where small and simple networks of computers could be controlled with impositions, the large-scale complex networks of contemporary information technology ought to be treated, in design and in maintenance, as "smart intentional infrastructure."

The shift to the intentional stance of course raises questions of whether things "really" have intentions. Is this just a "figure of speech"?

> Perhaps this makes you think of promising something to a friend, but don't forget to think about the more mundane promises we take for granted: a coffee shop serves coffee (not bleach or poison). The post office will deliver your packages. The floor beneath you will support you, even on the twenty-third level. If you could not rely on these things, life would be very hard. (Burgess 2015b: 39)

We are to think of promises, then, as environmental as well as explicitly designed (coffee is not designed as such), as embedded into surroundings by the particularities of cultural and technical histories. The language of Gibson's ecological psychology would not be out of place here, for promises are relational to the kinds of bodies and purposes that come into articulation with them, and that may foster them over time (in the

terminology of the theory, promises are made to specific promisees, not to the world in general). The post office's promise to deliver is addressed to *some* kinds of beings in its vicinity; for others, its promises may be quite different (its guttering promising perhaps a place to roost).

In certain places, however, the concept can seem rather thin: "an *intention* is nothing more than the selection of a *possible outcome* from a number of alternatives, based on an optimization of some criterion for success" (Bergstra and Burgess 2019: 7). They note that promises are intended to capture the sense in which inanimate objects "serve as proxies for human intent" (Bergstra and Burgess 2019: 14; also Burgess 2015b: 9). Are they in danger here of falling back into imposed intent, against their own notion of locality? If a promisor is a proxy, then we might indeed question whether there it has much real autonomy.

Bergstra and Burgess do fall back upon a "default" apportionment of intention as naturally human. We might, however, read this as a sign of context, an anticipation of aspersions of animism, the interpretive effects of being seen to confuse categories that have held fast in the West for millennia. There is of course a vigorous literature on the cross-cultural nature of apportionments of agency and perspectives between humans and nonhumans (notably, Viveiros de Castro 2012; Descola 2013): not, however, a literature with which their readership is likely to be familiar.

Instead of interpreting this *being a proxy* as implying that intent is derived from some particular humans that can be located and pointed to, we might more generously interpret it as referring to the embedding of technical things in the world, the historical sedimentation of selections that forms worlds. It is not as a physical object that a technical thing has its intent, but rather as an historical object. In cases where a designer can be pointed to, there is of course a particular human agent involved in this history, but even here, many elements combine which have unwritten and tacit pasts of imitation, inspiration and copying, as well as the historicity of cognitive capacities involved in the designing (Millikan 1984). A humble webserver would then bring together many threads of intent: that of its designer, the architect of its implementation, but also the history of imagining computers as network endpoints, the concept of service and the history of servitude.

The appeal to a depth of intent in formulating the problem of configuration management is not, I suggest, a simple rhetorical move, making

use of metaphor as a route to a better explanation. It draws on the deep history of relating to other beings as having intentions and purposes, the history of the figurations we inhabit, of sharing space and co-habiting a world alongside others with intentions of their own. It is significant, I would suggest, that Promise Theory emerged from the relationship of configuration managers with the increasingly complex infrastructures under their care, rather than as an intellectual project driven by an abstract problem. Where configuration management had previously entailed a relationship of imposed order, the complex distributed systems of the 1990s (and since) entailed a subtle shift, in which those systems' contingencies, the fact that they may always be in a state other than the proper one, came to have new significance: no longer an invitation for a corrective intervention, they required stewardship and care (see also Kocksch et al. 2018). The historicity of relations with technology is thus doubly entwined with the historicity of technical function (Spencer 2021): firstly in the figurations of technical systems as purposeful and intentional, and secondly in the novel possibilities these shifts open up.

Like CFEngine, Promise Theory participated in the development of infrastructures more widely, most obviously where it is directly cited as inspiration or support. The approach, for instance, is named as the basis for managing policy in the networking giant Cisco's "intelligent networks" (Cisco 2014). A second example comes from nearer to home. Adam Jacob, who had originally developed the "Chef" configuration management system, described his thought process in devising plans for a new application automation system he named "Habitat": "I think there is an application problem. I think we are thinking wrong about the shape of the application. And what if … applications could behave as well-behaved actors in like a promise theory sense? And what would be the promises that those applications make to each other? And from there it led to Habitat" (Jacob 2018, np). Treating applications as actors rather than as software (which begs the question of whether they are running properly), Habitat provides an infrastructure for the mutual monitoring of applications and their ability to propagate information about each other through "gossip." The intents embodied in these infrastructures have many sources, but it is not a stretch to include among their number a "promise theoretical" refiguring of machinic intent.

Figuring Infrastructure

While Promise Theory (and configuration management in general) may have escaped attention among critical scholars of technology, the circumstances in which automated configuration management appeared are rather familiar. In addition to being the site of emergence of CFEngine, scientific computing environments of the late 1980s and early 1990s had a formative influence on the development of social approaches to the analysis of infrastructure.

It is a truism of science studies that scientific practice is not a singular phenomenon, but consists of a plurality of epistemic cultures (for instance, Galison 1996; Knorr-Cetina 1999). On a more mundane level, as Burgess puts it, in the sciences "every kid is special": because research agendas can point in their own unique directions, demands for specialist equipment and unique configurations can readily override institutional pressures to adopt standardised technology. With tendencies towards computational heterogeneity built in, it is no surprise that CFEngine and modern IT configuration management emerged from a university research context rather than, for instance, the IT departments of commercial organisations, or Silicon Valley.

Another infrastructure very much of this moment was the Worm Community System (WCS). WCS was an information sharing tool, funded in the US by the National Science Foundation, and designed for the global research community studying C. Elegans, a nematode worm widely used as a model organism by molecular biologists. On the WCS team were two ethnographers, Susan Leigh Star and Karen Ruhleder, whose participation in and analysis of the process of implementation proved profoundly influential in the development of sociocultural research into infrastructure, maintenance, computer-supported cooperative work, standardisation and communication (Star and Ruhleder 1996). What they called, with the gerund-ified flourish of grounded theory, "infrastructur*ing*," named that situated and practical process of *becoming infrastructure* which was both goal and problem for WCS.

Making sense of the WCS project, Star and Ruhleder argued, required a *relational* approach to infrastructure. In a departure from emphases on wide arcs of technological development, and the stabilisation of designs

(e.g. Bijker et al. 1987), Star and Ruhleder foregrounded the embeddedness of infrastructure, its intrinsic relationality with and in sites of practice. Technologies become infrastructures as a contextual achievement, in which their use becomes integrated into routines of practical activity, so much that they are no longer explicitly put to use, becoming "sunk into" the background of practice. Because of this relationality, established infrastructure resurfaces once more in special moments, those of "infrastructural inversion," either through the methods of a social scientist or as a result of a fault or breakdown which disturbs practice (Star 1999).

The WCS aspired to infrastructure. It aspired to become the basis for collaboration across a wide community of researchers. But becoming infrastructure is not straightforward and certainly hard to impose. Despite the best efforts of the team, WCS ended up being little used (Star 1999: 380). The problems it faced could not be traced to a single root cause; the ethnographers encountered diverse resistances cropping up across diverse sites. To make sense of these challenges, Star and Ruhleder turned to the cybernetician Gregory Bateson's theory of communication, arguing that contextuality itself had frequently become the source of problems for the project. For instance, technical instructions that were seen as simple information about what to do by their originators, were for some recipients complex signs that differentiated kinds of persons: those for whom the instructions appeared straightforward, and those for whom they were anything but.

> As with Bateson's levels of communication or learning, the issues become less straightforward as contexts change. This is not an idealization process (i.e., they are not less material and more "mental"), nor even essentially one of scope (some widespread issues may be first order), but rather questions of context. Level one statements appear in our study: "Unix may be used to run WCS." These statements are of a different character than a level two statement such as "A system developer may say Unix can be used here, but they don't understand our support situation." At the third level, the context widens to include theories of technical culture: "Unix users are evil—we are Mac people." As these levels appear in developer-user communication, the nature of the gulfs between levels is important. (Star 1996: 117)

Successful infrastructures bridge local contexts. The process of *becoming infrastructure* is thus liable to act as an irritant for all kinds of contextual particularities. The connection I have in mind with configuration management, with Burgess and Promise Theory, is not about how they imagine infrastructure, but rather, this: the way in which, in circumstances of configuring complex distributed IT systems, locality becomes ontologically foregrounded.

To make the resonance clearer, the connection might be made with Star's earlier and similarly influential research into cooperation. In her 1989 account of Berkeley's Museum of Vertebrate Zoology, written with James Griesemer, she argued that consensus is not required for cooperation or for the emergence of common understandings. Cooperation, in short, must emerge *across* boundaries of intelligibility, rather than breaking those boundaries down. They argued, indeed, that "*all* science requires intersectional work" (Star and Griesemer 1989:392 emphasis added). Their concept of "boundary objects" denoted those interactive forms that mediate and coordinate across divides of intelligibility. These included *repositories* such as libraries or museums, *ideal types* that "delete local contingencies from the common object" (Star 2015, p254) such as representations found in scientific atlases, *terrain with coincident boundaries* such as the common referents on maps (while the professional biologists and amateur collectors Star and Griesemer studied produced very different kinds of maps, the referents they had in common facilitated their collaboration), and administrative *forms and labels* which use semiotic constraints to standardise information (Star and Griesemer 1989).

Star later complained that in its scholarly reception, the concept of boundary objects was most firmly associated with interpretive flexibility (Star 2010). Any such object would indeed need to be meaningful across different local contexts. But she was also concerned with the composition of open systems, something that received less attention. In an early formulation presented to an audience of artificial intelligence researchers, Star suggested that boundary objects are "simultaneously metaphor, model, and high level requirement for a distributed artificial intelligence system" (Star 2015 [1988]: 249). Such a system would need to be characterised by processes that mediate between their local particularities and higher-order coherence. For boundary objects, that meant a "tack[ing]

back and forth" between the kind of vagueness which renders things capable of being held in common between heterogeneous viewpoints and their local manifestations specific to just one (Star 2010: 604-605).

It would not be hard to read Promise Theory in these terms. Unlike deterministically imagined obedient computer networks, the coherence of smart intentional infrastructure emerges from just this kind of "tacking," sailing against a prevailing wind (whether figured as "rot," "drift" or "divergence") by means of a series of zig-zagging trajectories. In common is the proper policy, the official record; in contrast its local manifestation is the contingent promise of the thing itself, which always of course may be otherwise than what it is supposed to be. The functional coherence of the whole is an achievement neither of the ideal or the contingent, but of the processes by which they are brought into interaction.

Star and Burgess, in other words, developed theories and pragmatics for building systems of distributed coordination. In both cases the promise of understanding emergent coordination across many, locally heterogeneous, nodes, required suppressing the intuition that this would be done, or explained by, the imposition of a single master ontology across the network, and in both cases the authors were engaged in projects for configuring systems, rather than acting as disengaged observers.

Mythologies, or Why Figure Configurations?

Promise Theory stands out among technical philosophy for its refusal to give priority to abstract, formal understandings of computation, typified for instance in the mathematical theory of algorithms, and instead emphasises the empirical materialisation of computing infrastructure, in specific networks and functional distributions, entailing contingent and localised embodiments of intent. The lack of a privileged centre was likewise a starting point for Star. She cites David and Smith: "When control is decentralized, no one node has a global view of all activities in the system; each node has a local view that includes information about only a subset of the tasks" (quoted in Star 2015 [1988], p246). A distributed system is brought together by means of boundary objects, not by obedience to a master command.

The tension between a formal "algorithmic" interpretation of computing and a more materially grounded approach is familiar and lively, perhaps never more so than in recent debates in critical studies of technology. For Ian Bogost, "the algorithm has taken on a particularly mythical role in our technology-obsessed era, one that has allowed it to wear the garb of divinity" (Bogost 2015: np). "In its ideological, mythic incarnation," he argues, "the ideal algorithm is thought to be some flawless little trifle of lithe computer code, processing data into tapestry like a robotic silkworm. A perfect flower, elegant and pristine, simple and singular" (Bogost 2015: np). In the lexicon of media theory, as well as in general parlance, the concept of "the algorithm" has become a handle with which to grasp the implications of computing in society. Divine, we might surmise, because such an abstract understanding leaves little room for appreciating the locality of intent. A god has surely little need for boundary objects.

Allowing the formal abstractions of algorithms to stand as synecdoche for the material complexities of computational infrastructures is irresponsible (a point also argued by Chun 2011; Dourish 2016: 2). "Concepts like 'algorithm' have become sloppy shorthands, slang terms for the act of mistaking multipart complex systems for simple, singular ones" (Bogost 2015: np). Much the same sentiment is voiced by Burgess, who opens his book *In Search of Certainty* with the proclamation that "[t]he myth of the machine, that does exactly what we tell it, has come to an end" (Burgess 2015a: 1).

Bogost, in an echo of Marx's analysis of "commodity fetishism," suggests that the divine algorithm is falsely animated by a trick of the eye, by which we overlook the material conditions of production, the real work that goes in to creating these effects. Burgess suggests that our problem is our lack of a sufficient vocabulary to address the empirical locality associated with contingent technical systems. The mobile associations produced in the wake of the automation of configuration management do both jobs: the "engine," the "phagocytes," and the "promises" evoke the missing agency of technical systems, while the expansion of automation tools populates the world of IT configuration management with metaphors that give fresh form to the subject positions of the otherwise overlooked maintainers and repairers, whose hidden work, in the background, enabled computational systems to look like "robotic silkworms" in the

first place. "Puppet" dressed up the system administrator as the puppeteer in control, and "Chef" as one engaged in a finessed art of high esteem, both in stark contrast to the beleaguered service personnel in stereotypically subterranean offices, grappling with unwieldy infrastructures, mundane problems and an onslaught of helpdesk requests.

Metaphors stick and slip. Just as a controlling puppeteer hardly captures the autonomy that Promise Theory attributes to technical things, so too do well-worn metaphors come to stand for the opposite of their original intention. "Orchestration," for instance, was one of the earliest metaphors for the automated management of networks. It suggests many autonomous parts moving in concert, but like the puppeteer it also implies a centre of control. Commentators were already using this connotation to tease out significant differences in the early 2000s. "Orchestration always represents control from one party's perspective. This differs from choreography, which is more collaborative and allows each involved party to describe its part in the interaction" (Peltz 2003, p46). Kubernetes, probably today's most well-known distributed computing system, is widely referred to as an *orchestration* system, yet reflects on the ambivalence of the metaphor within its own documentation: "The technical definition of orchestration is execution of a defined workflow: first do A, then B, then C. In contrast, Kubernetes comprises a set of independent, composable control processes that continuously drive the current state towards the provided desired state" (Kubernetes n.d.).

Metaphors of puppets and orchestras may appear blunt instruments to humanistic critics accustomed to searching for subtler layers of significance. But as figuration, as re(con)figuration, the working over of even these blunt instruments is an index of a question: what is (a)kin to the systems we are building and looking after? If figurations are inhabited, in the sense of being stances, ways of readying oneself in relation to another, attending to figurations might attune us to the ways that the evolving nature of technical stewardship has re(con)figured relations, and not just the words we use to talk about them. The stance we take towards distributed intentionality, towards our "smart intentional infrastructure," is not just how we choose to represent it, but the kind of readiness entailed in relations to the local and contingent in a complex system.

The work of figuration nevertheless stirs up in its wake a detritus of metaphorical imprecision, and with it an enduring salience of "myth," a treasured metaphor for metaphors gone stale: mistaken, naïve, of their moment. For what we do with "myth" is exactly what Star elicited through Bateson. By referencing Western stereotypes of "primitive" thought, myth takes our communication "up" a level or two. It draws attention from the content to the context of the "mythical" belief, as some Other's belief, which sorts out kinds of persons, those provincial people, from elsewhere, or back then, who would take it at ground level. The kind of person who would be taken in, and who they are like. Applied across contexts, it dredges up infrastructures both entrenched and would-be: the perfect flower algorithms and the obedient computer.

The urgency of debunking myths in the critical studies of technology is a legacy of its obsession with the politics of representation, with the metaphors in and of technology, with "whose metaphor brings worlds together, and holds them there" (Star 1990: 52). If a newer wave of scholarship might be identified, around what Amoore calls a "*cloud ethics* … concerned with the political formation of relations to oneself and to others" (Amoore 2020: 7) "sustained by conditions of partiality and opacity" (Amoore 2020: 8), would it be a surprise if it were precisely practical relations with heterogeneous distributed computing systems that prompted the most radical re(con)figurations of the technical beings we live among and through?

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7

Figuring Molecular Relapse in Breast Cancer Medicine

William Viney and Sophie Day

Introduction

Medical practice and research in oncology increasingly involve and respond to highly various and heterogeneous disease classifications, which evolve with time and in response to emerging programmes of treatment and research. These reflect novel practices that produce different forms of risk prediction and risk analysis. Supported and facilitated by translational research programmes, trials networks, and interoperable

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data sharing platforms maintained by diverse collaborative groupings, there has been a proliferation of breast cancer subtypes and treatments (Day et al. 2016; Cambrosio et al. 2018; Bourret et al. 2021; Day et al. 2021). During an ethnographic study of personalised breast cancer medicine and healthcare in a London hospital (2018-2021), members of a research group of which we are members learned that research in tumour biology is highly complex (Day et al. 2021; Day, Smith and Ward, chapter 8, this volume; Viney et al. 2022). And while treatment for primary disease is increasingly effective compared to other tumour types, especially when treated at an early stage (Cancer Research UK 2021), the return of cancerous cells after the treatment of a primary tumour—known as a 'recurrence' or 'relapse'—can be difficult to predict for individual cases. It is cancer's uncertain return, its temporality, and the figures its times generate that is the subject of this chapter.

Cancer cells have been observed in human blood since at least the later nineteenth century (Ashworth 1869). Fragments of cell-free nucleic acids in human blood were first described in the 1940s (Mandel and Metais 1948), and cfDNA was identified and associated with cancer in the mid to late 1970s (Leon et al. 1977). The serial measurement of these and other biomarkers has long provided hope: "sequential measurements of DNA concentration may be a useful tool for monitoring the effects of therapy" (Leon et al. 1977: 650). The promise contained in this 'may' is just one temporal effect of liquid biopsies, which have been made to occupy the future anterior tense,[1] which we argue anticipates figures and generates figures to be retrospected (Brown and Michael 2003). Considering these figures allows a greater appreciation of how cancer research places and transfigures disease, placing it in time, and making it 'historical'. The study we focus on here figures the relapse of disease for patients treated for breast cancer and who are classified as being at high risk of developing metastatic recurrence. Our engagement with this study occurred when the scientific research group published early findings, and, fortuitously, we were able to observe how scientific findings were being

[1] Some liquid biopsy studies now track cell-free and circulating tumour DNA in time-based practices: 'early' and 'earlier' and 'just in time'—so resonating with precision practices in other domains. As a consequence, liquid biopsies represent enduring promissory figures—'soon' and 'not yet'—that herald improved patient outcomes.

made public. We noted how concepts of disease and the people associated with disease were being figured by these figures. We wanted to learn how people and groups of people are incorporated and at times excluded by numbers, images, and texts. If figuration is a methodological practice, this chapter reports on figures as objects of discovery and description and, concurrently and in combination, as epistemic and symbolic matters of concern.

During our research, in formal and informal interactions with clinical researchers, we learned that, at molecular levels now explored via contemporary diagnostic and treatment technologies, tumour biology does not usually conform to easily predicted norms and averages. As one oncologist explained as we began our interviews, "we're in this era where it's expanding the varieties and number and types of cancer due to the molecular characterisation of each patient's cancer ... virtually every patient has a different type of cancer due to the genetic changes that occur in the cancer compared with normal tissue." Their colleague in oncology summarised: "there are no more averages. I can quote averages from clinical trials, but we don't know."

One promise of a more 'personalised' or 'precision' medicine is that recommendations will provide 'the right treatment, to the right person, at the right time' (Keogh 2015; Scoltz 2015). Despite this promise, tools to enhance precision and prediction in oncology move by contingent increments, where definitions of 'right' change gradually. Different scales and speeds of implementation and impact can be narrated from different situated perspectives. Narrating these diverse perspectives on 'targeted' approaches to oncology is not easy with the views of patients and staff varying widely. One claim of this chapter is that understanding developments in translational medicine might be aided by documenting and discussing how figures are made and maintained by different actors involved in this work of targeting. Patients, clinicians, biomedical, and other kinds of researchers make and interact with these figures, and they comment, evaluate, and form expectations about figures. In this chapter, figures are an empirical proof and promise in ways that are at once confirmatory and confounding. In precision oncology as in other fields, figures are contested and can attract conflicting values based on different interpretations of their performance.

Background to 'An Exploratory Breast Lead Interval Study' (EBLIS)

One approach gaining popularity among biomedical researchers in oncology involves monitoring the presence of tiny fragments of cell-free DNA (cfDNA), some of which can be associated with tumour cells known as circulating tumour DNA (ctDNA). The practice of detecting and analysing ctDNA in fluids for diagnostic purposes is called 'liquid biopsy'. Liquid biopsies are created to detect, measure, and analyse disease in a minimal, residual state. Researchers use genomic and other omic sequencing techniques to identify these molecular signs of disease and, in oncology, disease recurrence. While temporal horizons of risk are currently formed for individual patients based on data using population averages or norms that contribute to the formation of groups and subgroups of patients, research studies tracking ctDNA adjust the practice, scale, and the horizon of relapse using molecular data from individuals. This approach detects and tracks micrometastatic cells in ways that are molecularly specific to individual patients, illuminating *when* disease relapses by reducing the question of *who* is affected to a single person, and opening new opportunities for learning *why* cancer returns.

As part of our work in the hospital service, our research group followed the progress of one observational study tracking ctDNA in a group of breast cancer patients: EBLIS, an Exploratory Breast Lead Interval Study. We were told by a clinical researcher involved in EBLIS that the study represented the only example of personalised breast cancer medicine in this London breast cancer service. Previous work by members of our research group have documented changes to how clinical practice and research is conducted in this service (McGrath-Lone et al. 2015; Day et al. 2016; Day et al. 2021; Viney et al. 2022). As a translational research study that follows a cohort of patients whose primary treatment had concluded, the status of EBLIS as a unique example of personalised medicine intrigued us. Motivated to learn more about this work, we followed study participants, clinicians, researchers, administrative as well as patient samples, and data over time and across different sites, following a process of data making and circulation, analysis, and communication.

Our observational and interview research followed EBLIS towards the end of its initial four years of activity. In total, 194 breast cancer patients had been recruited from 3 UK clinical sites (1 October 2013—8 July 2016). Out of which, 188 were tracked for the first 4 years of the study. While this group of patients constituted a group or cohort they were not recruited based on shared biological or therapeutic characteristics. And patient-participants were varied in terms of age at diagnosis, histology, hormone receptor status, and treatment. But all patient-participants shared in risk categories—numeric values that related them as a group to a near but imperfectly known future. They were at high risk of clinical relapse based on a digital risk prediction tool called Adjuvant! Online (see de Glas et al. 2014; Lambertini et al. 2016). Here 'high risk' was defined in terms of risk of mortality equal or greater than 50% at 10 years without therapy, or corresponding to a relapse rate of 65% at 10 years without treatment. While EBLIS generated novel numbers for clinical researchers, this was possible because it was embedded in existing practices of clinical figuration. This wider scheme of figure-making between existing, emerging, novel and established material occurs at many scales, and the dynamic temporalities of making ctDNA a clinically actionable biomarker will become clearer by describing the circulation and combination of different figures of disease.

At the beginning of their care in the hospital, patient-participants provided a sample of their tumour. This sample was used by researchers to specify the molecular profile of their primary disease, using a range of next generation—omics sequencing technologies. Researchers leading EBLIS collaborated with a US biotechnology company to create a "bespoke amplicon design pipeline" that nominated PCR primer pairs for a given set of genetic variants. In brief, somatic variants were identified at a patient level, pairing the primary tumour sample with matched white blood cells using whole-exome sequencing (WES). Each patient's tumour was attributed a signature, composed of 16 highly ranked pieces of genetic code selected to create a "custom patient-specific panel" of mutations. Subsequently, the clinical research group collected blood samples at six-month intervals and checked this against the patient-specific panel, to track and measure changes in the volume and characteristics of ctDNA over time. The study therefore developed a 'personalised' analysis

insofar as it tracks disease at molecular, patient-level and patient-specific conceptions of disease progress. Each patient participant in EBLIS has had their tumour sequenced in a way that is specific to their tumour characteristics. They are then followed on the basis that they are unique, each patient participant providing their own baseline for an evolving sequence of testing and retesting.

Approximately 6 months into our fieldwork EBLIS reported its design and results, providing information for the first 49 patients who had relapsed since consenting to be part of this research study. Appearing in *Clinical Cancer Research*, these results were published in April 2019 (Coombes et al. 2019). EBLIS had set out—among other things—to bring more predictive certainty to recurrence, and this publication uses diagrammatic reasoning to present its experimental findings. It did so with a set of contrasting figures, expressed in diagrams, plotting somatic changes of emerging experimental interest against common clinical biomarkers and screening technologies used in the NHS. It visualised a new temporal event or horizon in order to present and illuminate an otherwise obscured object of clinical interest: a threshold number of ctDNA that declares cancer's return. By tracking ctDNA, the group suggest the clinical utility of "molecular relapse", which they separate from "clinical relapse", a term used to denote recurrences discovered through existing screening systems and technologies.

The findings summarised and plotted in diagrams suggest an ability to detect a recurrence up to 2 years ahead of existing screening technologies (median=8.9 months; range=0.5-24.0 months). The diagrams (see Fig. 7.1) are works of figuration that gather, propose, and represent this novel event as a temporal interval by contrasting molecular and clinical relapse, demonstrating the potential usefulness of one figure in contrast to another. More generally, the study uses, enacts, and contrasts many figures: its work of figuration has many dimensions and horizons, with these two-dimensional diagrams used to picture cancer's progression central among them.

One figure is a grouping of 6 panels, where A-E visualise an increase in plasma levels of ctDNA in 5 individual patients, 1 patient per panel, as they were collected over time. The *y* axis shows variant allele frequency (VAF) of gene mutations that compose each "custom patient-specific

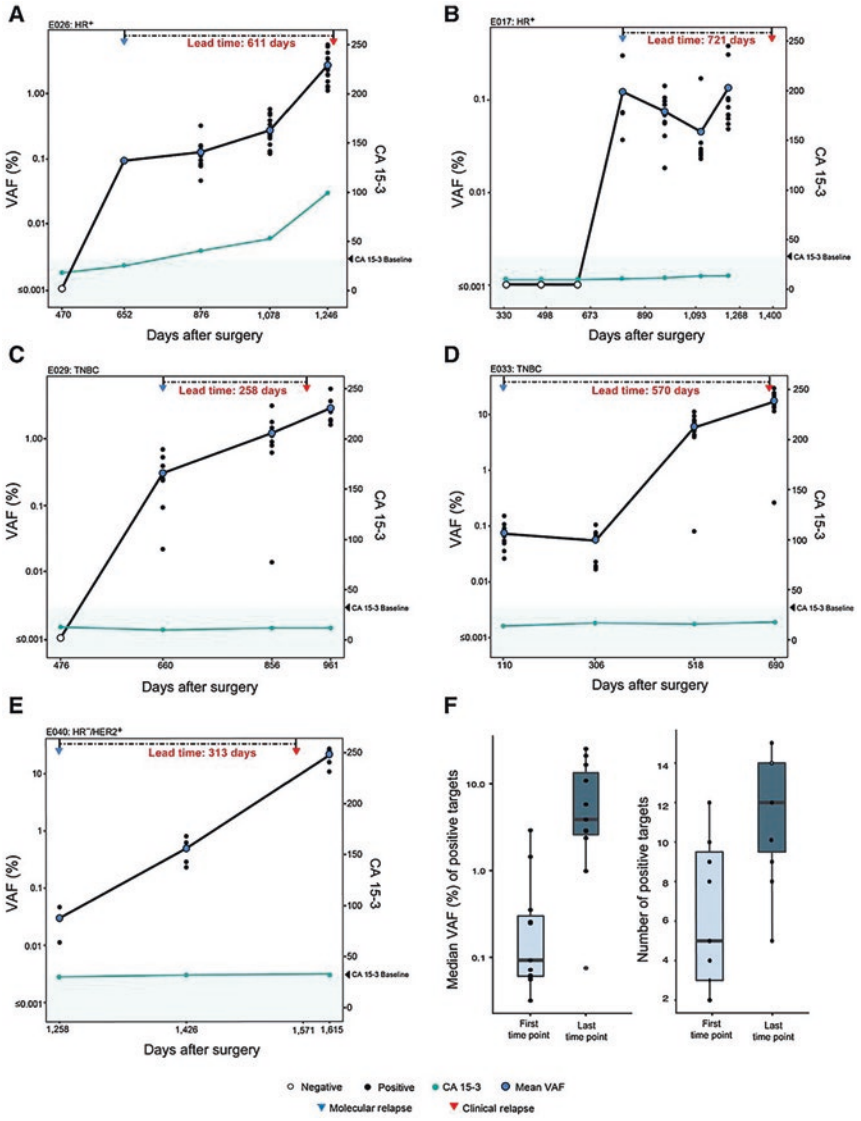

Fig. 7.1 "Personalized profiling detects rising ctDNA ahead of clinical relapse"—diagram published in Coombes et al. (2019)

panel", and these lines plot the number of variant reads divided by the number of total reads and reported as a percentage. The *x*-axis shows days after surgery. The lead time—the interval between ctDNA increasing in plasma samples to indicate recurrence and when the patient was diagnosed via the hospital's existing screening system—is shown at the top of each panel by a red triangle and blue triangle connected by a dotted line and expressed in days. This is the time interval between clinical relapse (red triangle) and molecular relapse (blue triangle). In contemporary breast cancer care CA 15-3 biomarkers are routinely used to monitor for cancer relapse. This biomarker is also graphed here (teal circle), with baseline levels (32 U/mL) marked in light blue.

These diagrams are used as visual evidence and proof of a wider set of practices that call on figures in different ways—methods of analysing and valuing figures in the interests of accurately predicting change. They show how EBLIS figured cancer in time: according to the durational intervals significant to tracking ctDNA and to a process of figuration that makes this time known as an experimental object. As we observed the study, we also became aware of the different horizons of hope and expectation being tied to the study's progress. As results emerged, patients were able to picture themselves in novel ways. However, while the research was being conducted in clinical contexts, the application of study outcomes were differently distributed. Interviews revealed the many interpersonal and institutional contexts by which practices of material and symbolic figuration were taking place, as well as the wider, consequential phases of clinical research that different stakeholders expect EBLIS to follow.

Inhabiting Cancer's Figures

Diagrams establish and maintain internal and external relations, drawing connections between multiple objects, practices, and persons. They contain common elements, according to what Sybille Krämer and Christina Ljunberg call "diagrammatic scenarios"—a synoptically flattened order or form spread across a two-dimensional plane, involving the interplay of points, lines, or surface points that articulate a set of homogenised relations. These elements ensure the diagram's reproducibility as a schema.

Rather than genres of image that are self-referential, Krämer and Ljunberg ask that we consider the "alloreferential" capacity of diagrams, which signify many and multiple concepts and objects of knowledge external to their form (Krämer and Ljungberg 2016: 10-11).

The word 'diagram' has this connectivity stowed in its etymological history, deriving from the Greek *diagraphein—dia-*, 'across, through', *graphein*, to 'scratch,' 'carve,' 'write'; 'to mark out by lines'. Modern diagrams function as "icons" that, according to Pierce, are used to gather "a set of rationally related objects" amenable to experimental practice and reason (Peirce 1976, 4: 316). And yet diagrammatic icons, for Pierce, do not relate objects passively or by neutral reason but take "the middle part of our reasonings", as mediation (Peirce 1998, 5: 163; Bender and Marrinan 2010: 23-56). EBLIS represents an approach to determining cancer's presence that is figural, insofar as it involves the presentation of knowledge mediated in diagrams. It invokes visual forms that picture relapse as a temporal phenomenon for individual patients. But as an experimental approach not yet fully tested and adopted into clinical practice, it is also temporary, provisional, and promissory, with regard to its truth and its future use. So, although the basis of likeness and comparison for current prognostic tools can draw frustrated confusion among users, the significance of EBLIS is that likeness and comparison are personalised, serialised as n=1. The objects they relate, the lines marked out mean they give a capacity to be inhabited and embodied (Haraway 1997: 11). This capacity, however, remains a promise at this stage of the research, it is prefigured, and these promises differ for patient-participants involved in the study as they do the clinicians and scientists leading the research, and the organisations, funders, and companies that participate in the study's progress.

Figural representation in the tradition considered by Erich Auerbach (1938/1959) involves a first event or person signifying both itself and the second that it involves or fulfils. Serial and recursive forms of historical representation structure and authorise the anticipation of prospective potential and retrospective analyses. Past and future phenomena are at once articulated and entwine. As a historical and aesthetic framework, Auerbach's theory of figuration illuminates the present as it is known and experienced as fulfilling a past, with each event or type of the past having

the potential to join another in the future. It is in this sense these figures depend on time lived conditionally, partially, or in state of waiting and abeyance. As historian Hayden White noted of Auerbach's figures, their flow and sense of trajectory is not known according to a linear sequence: "the making of a promise," White writes, "can be deduced retrospectively from a fulfilment, but a fulfilment cannot be inferred prospectively from the making of a promise" (White 1999: 89).

While Auerbach's historical theory concerned a combination of theological and literary examples, combining the material-symbolic fulfilment of parabolic narratives, signs, and portents. He theorised the distributed effects of figures as epistemic patterns and as ways of materialising the abstract, making the symbolic concrete in a moving present. The making of molecular relapse as a form of historical knowledge cannot (yet) be determined prospectively; it needs the retrospective relief of clinical relapse to have epistemic value, in the same way that biblical testaments are marked old and new in a figural relation to one another. While personalised blood monitoring of ctDNA presents a novel technological intervention based on high-throughput, next-generation genetic sequencing it also follows an archaic analytic structure, insofar as it relies on serial figurations of something unresolved: a (yet to be defined) disease-in-progress. Figures of this kind follow one and another, as figures prefigured, as each test depends and has value according to its place in a sequence.

As a study whose aim is to bring greater certainty over future events, the outcomes of EBLIS were uncertain when we were conducting our fieldwork. Given this uncertainty its figures needed to be managed for patient-participants, and they, in turn, needed to learn how to manage figures of promise. When enrolled into the study patient-participants were told that clinicians and researchers "will not be performing any tests that have an influence on your care. It is therefore unlikely that the study will yield any new information that will affect you personally."[2] As a consequence, study feedback to patient-participants was limited to communications concerning their continued participation and enrolment. Because clinical researchers were unsure of the outcomes of the study and

[2] Patient Information Sheet (13/LO/1152), Version 4, 10/10/2018.

because there exists no data to show that treating patients based on ctDNA has better clinical outcomes, patient-participants in EBLIS could not follow ctDNA levels as they were being tracked by this research group. They occupied and were preoccupied by the figures but did not (yet) inhabit them.

When participants were recruited and when they were later consented to extend the study in 2018–2019 for a further 4 years, they were told "there is no benefit to you personally from taking part in this study."[3] But visits to the clinic formed part of the research and gave patients access to an oncologist: a skilled specialist that understood and appreciated the potential long-term side effects of hormone medication that many participants were taking. The clinician who met them every six months felt the care she gave was minimal: "they are so stable, it's quite a steady thing in the trial clinic just doing the same thing on them every six months. You're not giving them anything, especially in the EBLIS trial, I'm not treating them, I'm not giving them any medicine". But patients we spoke to perceived (and some reaped) the benefits of a greater level of care than if they were not research participants.

When we interviewed them almost all the women we met reported benefits that were psychological or material, personal, interpersonal, or social. Jill told us that she liked "the possibility to come here [to the hospital] every half year, even though my treatment is finished already".[4] This gave her "peace of mind" and made her feel "more relaxed" about her cancer and its uncertain future. Likewise, Margret appreciated the sense that she was being monitored, not by the new technologies being pioneered by EBLIS researchers but by simply feeling that "someone was keeping an eye on me". Gaining peace of mind in the present and near future, through the continuity of care that research participation offered was seen as one benefit. The benefits of liquid biopsies in the future were less clear.

These contrasts over the valuation of care in the research may indicate the differing interpretations of what being 'stable' means according to patients and clinicians, at different stages of cancer care, particularly in

[3] Patient Information Sheet (13/LO/1152), Version 4, 10/10/2018.

[4] All names used are pseudonyms.

the precarious period after treatment when cancer may or may not recur. They are differences of perspective that pivot with the availability and distribution of clinical and experimental figures, that also mark a difference between 'standardised' provisions of care and those associated with research. Although participants were not able to inhabit the personalised figures that tracked ctDNA, they valued being monitored in trial clinics and believed that they would help bring improvements to clinical practice in years to come. Participating in this research study helped them manage the uncertain relations with their own health, while contributing to the transformation of relations to risk for others.

The promise-fulfilment structure characteristic of Auerbach's description of figuration illuminates these shadows these developments in EBLIS and in the larger field of molecular genetics. Of the 13 women we interviewed in 2018–2019, 4 understood that EBLIS was tracking their ctDNA in a way that they understood to be 'personalised' or 'individualised', and in this sense they understood the broad intention of the specific research study. Many spoke in broader terms of tracking biomarkers in the blood, and this would, they assumed, help bring about a more timely diagnosis for other cancer patients. Comprehension of when this might be possible and how tended to be vague. One participant explained that she simply wasn't sure whether the study was looking at "bits of DNA or bits of protein. I don't know what they were looking for".

How the information EBLIS generated about patients and patient groups, and how study information may influence the course treatment, was also unclear to others. One woman was confused as to whether or not EBLIS would help her understand her risk of relapse. As the conversation developed she said she wanted to learn more about what was being discovered: "what are they finding out from it, because that's interesting in itself" she said. "Even if they were finding out nothing, that would be quite interesting too, wouldn't it?" Another woman expressed her frustration at not being told more about the research study she was involved in. Susan told me that she is eager to participate in research provided that participation meant the outcomes were transparent. She felt that an opportunity was being missed to think differently about the individual as a research participant: "you're dealing with people and you want to make it individualised medicine," she said, "so if you want to individualise it,

you can't ignore the individual." And yet, as we found when we interviewed clinicians and researchers, returning experimental results with no proven or straightforward programme of treatment could risk a duty of care involving clinical, ethical, and legal promises that cannot currently be fulfilled.

Wider contributions from social science and humanities scholars have noted the harms of elevated or unrealistic promises and expectations associated with more personalised or precise medical approaches (see Feiler et al. 2017; Erikainen and Chan 2019). These scholars stress the shortfalls between promise and reality and the personal and public losses that follow (see Dickenson 2011; Prasad 2016; Maughan 2017; Rushford and Greenhalgh 2020). Others have documented how hype, promise, and expectation play a constitutive role in biotechnological innovation, with discursive speculation influencing the material shape, quality, and extent of collaborations, resource allocation, and markets (e.g., Brown and Michael 2003; Brown and Michael 2003; Martin et al. 2008; Adams, Murphy, and Clarke 2009; Tutton 2012; Haase et al. 2015). These sociologies of expectation, hope, and anticipation document the work of discursive prospecting that accompanies biotechnological innovation. Research in liquid biopsies coordinates and manages resources via an iterative, test-retest logic of embedded promises and expectations. And studies like EBLIS, with its graphic recomposition of text, image, and number, and its provisional stratification of persons according to molecular progression, do not pose one possible future but many.

In addition to the views of patient-participants, whose hopes and expectations we found to be managed within a framework of rolling consent common in translational research, our interviews with clinical and laboratory researchers managing EBLIS saw its potential in different ways; they recognised its accomplishments, uncertainties, and possibilities, figuring different durations via given modes of participation. Currently, patients receiving cytotoxic therapies for overt metastatic disease rarely see curative outcomes. In the more distant future, with an expansion of trials and studies that can investigate using ctDNA levels to guide clinical decision-making, it might be possible to "salvage patients who are ctDNA-positive with second-line therapies" (Coombes et al. 2019). Here there is a desire for a just-in-time change to future outcomes,

based on better predictions of what is likely to pass. One clinical researcher, interviewed at the time the article in *Clinical Cancer Research* went to press, described EBLIS as being able to "open the door to potentially an entirely new paradigm" for diagnosis, treatment, and monitoring.

This clinical interest in treating patients earlier and providing them with better clinical outcomes was contrasted to the potential problems this technology might cause in the more immediate future:

> we've developed a test which is in advance of having any treatment for the patients, which has been proven to benefit them. So in a way, from the patients' point of view, I think it's a bit of a disaster, because now it's going to be wheeled in, these results are all going to be given to all the patients. They're going to have their results that show they've got some problem in the blood, and then they're going to come back three months later and it's going to be even higher. There's going to be no scan evidence of any disease, and the doctors won't know what to do.

At a stage when the patient using liquid biopsies in this breast cancer clinic remains a figure to be realised—at least in the NHS—the treatment of patients remains dependent on future programmes of research that enter further, iterative patterns of promise and fulfilment.[5] In this clinician's view EBLIS indicates the need to follow stratified sub-groups of relapsed patients whose earlier treatment could show the benefit of treating at the point of molecular rather than clinical relapse:

> at the point of molecular relapse, you could have a total of perhaps as many as 10 to 20 phenotypes of patient. So you're going to have to design multiple trials for each of those subcategories of molecular relapse, each of which will involve as many as 1,000 patients, and long follow up, and survival analysis.

Previous patient cohorts that were divided and treated by broad molecular and histopathological groups may now face further subdivision, according to when and how they relapse via threshold numbers of ctDNA

[5] At the time of writing this chapter, liquid biopsies were being trialled in different NHS sites (see NHS England 2020).

detected. What is distinctive for the personalised tracking of cancer when thought in terms of its promissory structure then is not that it is subject to a see-saw motion of hype and disappointment, or that it makes a single promise for a group of susceptible patients and investors, but that the system of analysis redistributes the basis of clinical groupings and the temporal grounds that once grounded predictions over long- and short-term durations. Historical time for individuals and groups is reconfigured with molecular evolution. Through a logic of serial testing and retesting, EBLIS marks out in lines the course of disease for individual patients, while recalibrating how cancer patients compare (or no longer compare) to others.

The graphic compositions noted above relate and visualise movement in forking, braiding deltas, where lines are read as figures not only of changing biomarkers that indicate somatic change but also interpersonal and comparative figures of analysis and feeling, which mark out links within and between individual patient-participants, as well as the wider ecologies of contemporary translational research in the biosciences (see Crabu 2018; Rajan and Leonelli 2013). Figuration links and combines via various scales, sources, and kinds of data, at once intimately personal and radically impersonal in terms of both duration and bureaucracy.

Studies such as EBLIS figure cancer's progression in experimental periods or intervals. These are significant for individuals in that they may influence the categories of disease status that help guide clinical decision-making. They may affect more generalisable definitions of precision by adjusting the 'right person' at the 'right time' with the 'right treatment'. In this sense, rather than simply fulfilling existing hopes and expectations attached to fixed ideas of 'precision' or 'personalised medicine', EBLIS refigures the temporality of the personal and the precise. However, even within the relatively short time period that EBLIS has been active, a study punctuated by documenting the utility of ctDNA for tracking breast cancer patients at high levels of patient specificity, it does not maintain a fixed understanding of the right person or the right time.

The first phase of research showed the non-invasive detection of preclinical metastases using a personalised ctDNA analysis. Researchers used tumour exome data to design patient-specific 16-plex assays and deep sequencing of plasma cfDNA at an average depth of 100,000 reads per

target, a sensitivity to the level of a single, mutant molecule. The next phase of research involved extracting the whole-exome sequencing (WES) data from serial plasma samples to find novel mutations and new copy-number events that evolved from the primary tumour (see Hastings et al. 2021). "You can also track the evolution of the tumour," explained one bioinformaticist, "and you can also see if a patient is responding to treatment or not." While the clinical researcher focussed on the validation of liquid biopsies in different patients, their colleague highlighted a potential for further research to understand the specific molecular characteristics of each relapse. Since blood samples taken from EBLIS participants were relatively large in volume, researchers explained that this next phase would use the same samples and occupy the same time points. In this sense the first phase of EBLIS could serve figures that then contrast to experimental figures of the future, where the first iteration informs the next. As serial test EBLIS has a serial, test-retest relation to its own progress. This additional layer of potential in the study data, working in parallel to patient-level tracking in follow up, and WES tracking of progression and monitoring among metastatic patients, promises a prognostic tool. The excitement that accompanies developments in molecular oncology may not necessarily lead to an infinitely granular segregation of cancer categories, treatments, and predicted outcomes, but to their recombination, albeit made up of different figures and a different idea of portraiture.

In short, EBLIS has multiple horizons composed of overlapping parts. These compositions and contrasts are a work of figures used to present its data; a broader, interlocking programme that progresses by incremental phases. Indeed, in combination with EBLIS phases one and two is another; there is a further phase of research that is broadly biostatistical and predictive in nature, aiming to take clinical and genomic data from other EBLIS sub-projects to build a prediction model using machine learning techniques. This model would "apply to anybody who's coming into the study, or any cancer that gets sequenced. You could run it against this model and see if they fit the criteria of a patient who might relapse". At the time of our interviews, using the data of relapsed patients to create a predictive model was in an early phase of planning and development. But even as a hope or possibility it tells us how a personalised, n=1

tracking study could be used to build different kinds of prospective cohorts—data to build a prognostic tool to determine another set of standardised outcomes.

Conclusion

In her 2019 memoir *The Undying*, Anne Boyer describes her diagnosis and treatment history. "My tumour," she writes, "started on a screen, and I returned it there. I entered its precise qualities into the prognostic calculator that promised to display the future in a pictograph. The dead women were represented by forty-eight dark pink frowning faces, the living ones by fifty-two smiling green ones. All of these faces were supposed to, like me, be forty-one years old and with exactly the same version of my disease, but none of these faces, living or dead, said why or when or who" (Boyer 2019: 41-42). Boyer explains that her disease is known to her as a screen image and her tumour's mediated qualities are not exclusively biological, they extended across a vast and comparative network. The sensory status of cancer as a 'silent killer' has long been linked to its malignant and unpredictable danger, giving further reason to picture it in different numbers, images, and texts. Personifying cancer's evasiveness—as a figure difficult to see, hear, or touch—is closely linked to cancer's exposure, capture, and control (Sontag 1978; Bowker & Star 1999; Lochlann Jain 2013; Semino et al. 2018).

This chapter has explored how novel molecular figurations of breast cancer challenge established methods of picturing its future course, both by breaking up sub-groups and by allowing the rapid introduction of targeted therapies. Meanwhile, research in the field of 'liquid biopsies' generates ways of figuring disease recurrence that tracks changes in disease for individuals, as a line or path determined by combinations of data. What this chapter has been keen to stress is how the workings of EBLIS for individual patients involve a *layering* of figures, emerging and residual, novel and archaic in pattern, that parallel trajectories of development and progression integral to wider infrastructures of translational research. To what extent such figures can be symbolically and materially

inhabited is a question of time. Or rather, a question of how time is questioned, coded and tracked, transformed into protocol and standardised.

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8

The Gardener and the Walled Garden

Sophie Day, Jayne Smith, and Helen Ward

Introduction

This chapter explores the close connections between health care and research in a London hospital through Jayne's—one of the authors[1]—experiences. We are an anthropologist (Sophie Day), a patient with breast cancer (Jayne Smith) and a clinical epidemiologist (Helen Ward) with different positions in this research hospital and different perspectives on experimental cancer

[1] We use first names in the text when referring to each other.

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care (Day et al. 2021). The first-person plural that we adopt therefore shifts in its referents. The letter from Jayne (below) shows that she wanted to know whether the samples she contributed to several medical research studies were useful and what had come of, and from, them. Strict governance of health data precluded Jayne from finding out herself, but Sophie and Helen had university positions that allowed them to cross garden walls into what are sometimes called Trusted Research Environments.[2]

Jayne is an absent presence in the 'detective work' we describe, marked by a moniker, 'the gardener'. This figure organised information flows among staff around hospital and research sites, many of whom had had never met Jayne and never knew her history. Because of this traffic, it organised our collaboration initially, configuring an inclusive 'we' that refers to our explorations of the history and implications of data-intensive health research and care as well as an exclusive 'we' that refers to the efforts that Sophie and Helen made to figure out what had happened to Jayne's samples and data. Combining insights as a patient and as staff, we show how this 'name'—referring to Jayne's occupation—fortuitously offered a conduit into a landscape of research and care, and the connections and gaps between areas of work as they changed over a period of six years.[3] We then turn to what the gardener was cultivating, namely 'Grumpa', Jayne's name for her tumour. If Jayne considered Grumpa was hers and indeed part of her, she was happy to share her tumour and Grumpa was detached repeatedly from Jayne in the form of 'golden' or 'precious' tissue samples and data. These 'cuttings' or 'seeds' elicited further work as clinical and laboratory researchers cultivated different forms of Grumpa in a series of walled gardens. We therefore understood that there were several gardeners in several gardens, all cultivating aspects of Grumpa and sensing the tumour differently through work practices which themselves changed in response to varied developments including efforts to realise the values of health data more effectively. We recognise a

[2] Walled gardens describe protected data enclaves where information from health services can be accessed by researchers. Platforms such as Facebook and Google popularised the concept of walled gardens as a way of storing and protecting data they collected on people's browsing histories or preferences (Plantin et al. 2018). Walls were designed to exclude competitors from access to valuable assets. Health regulators also developed practices of walling gardens or Trusted Research Environments to protect patient confidentiality.

[3] Sophie and Helen have shown the importance of different perspectives on health services through collaborative work among staff, patients and researchers (Ward and Day 1997; Day et al. 2017).

series of figure/ground reversals that shift the relations between gardener, plant and garden. Grumpa too can be figured as a gardener, cultivating us all—the three authors as well as clinical and research staff—insofar as it motivated sustained exploration into its mutable materiality and the conditions in which it diminished or thrived.

A Letter, Jayne Smith (2019)

After Sophie and Helen had conducted interviews and attended relevant meetings, Jayne put her thoughts into a 2019 letter for the three of us.

"After 2 years of living in fear and denial, I was diagnosed with bilateral metastasised breast cancer in early 2013. … Just by looking at my breasts it was obvious that the disease was advanced, … but the clinical staff who treated me showed me the utmost kindness…. In fact, I got the impression that they saw me as an extreme case, if not a curiosity, hence the heightened interest in me.

From almost the beginning of my treatment I became involved in some kind of research. That, in itself, gave me some purpose in dealing with my disease, with a hope that my misfortune could eventually be beneficial to other breast cancer sufferers, and it therefore put a positive spin on my condition. I was first involved in some research with Helen about patient experience, which also helped me clarify things in my own mind.

The first two years of my treatment consisted of hormone medication, which seemed to work for about 18 months, but then fungation[4] set in, and I had to accept surgery. At the same time, I was offered the opportunity to take part in the RADICAL trial, which was testing a drug which would boost my existing hormone medication. The registrar and trial coordinator seemed very keen that I should do it, so I agreed - if it could be beneficial to me and also help others, why not?

A few weeks after the trial started, I had a mastectomy and lumpectomy, and the tissue removed was given to the RADICAL research team. I was on the trial for three and a half years, and it seemed to work by keeping my disease stable without my suffering extreme side effects.

[4] Fungation occurs when a breast tumour involves the local skin causing a wound which can ulcerate and become infected.

Every four weeks blood samples were taken and sent off for research. As time went on the clinicians caring for me became more and more amazed that I was tolerating it so well. When the trial had to end in June 2018 because my cancer had progressed, the tissue from my second mastectomy also went to research.

Up until now, I just thought that all my cancerous boobs and bodily fluids had disappeared anonymously into an abyss of data, together with those of millions of other cancer patients - just a drop in the ocean. However, I did hear unofficially that my 'bits' were viewed as coming from a 'gold' patient, and that there were only 2 other gold patients in this lab. Given the opportunity, I would love to reveal myself as that 'gold' patient and find out how my samples were used and whether they were instrumental, even in a tiny way, in any breakthrough in the treatment of breast cancer. I know patient confidentiality is of paramount importance, but there must be a way round it for consenting patients.

In the 'Garden' analogy, to me my breast cancer is a unique hybrid plant I have grown, which has been taken for propagation into a walled garden to which I have no access. I would like to see what has happened to it. Did it end up on the bonfire? In the compost? Were seeds/cuttings taken? etc.

Is there a shortage of patients willing to allow their tissue etc. to be used in research, and if so, would the ability to know the outcome increase patients' willingness to participate? The fact that I am still involved in some kind of research such as this continues to put a positive spin on my condition."[5]

"I'd like to know what they've done with my stuff" (Jayne, 2018 interview)

We met in 2013 as Jayne became a patient. She presented relatively late with advanced disease and wanted to avoid surgery and chemotherapy. Following her initial diagnosis and treatment preferences, as Jayne writes

[5] We use double quotation marks for verbatim citations and single quotation marks for records from our field notes.

in her letter, she began hormonal treatment—with an aromatase inhibitor called letrozole. Her tumours shrunk and she remained relatively well for more than a year. In 2014, the tumour on her left side started fungating and, in early 2015, she had a mastectomy and lumpectomy. She also joined a clinical trial, the RADICAL drug treatment trial (Seckl et al. 2017), for three and a half years until further symptoms meant she had to stop the trial drug. As far as Jayne was concerned, the treatment 'which was to boost up the letrozole' had worked and perhaps saved her life. She subsequently had a second mastectomy and changed her aromatase inhibitor. We had heard about some of these developments from colleagues, for example, when Jayne featured in a newspaper article about a local gardener on a cancer trial (Rivers 2016) and when she gave a talk to an experimental medicine conference. Her 'case' interested staff in the service and beyond and was attached to the label of gardener as it was discussed, with her consent, at internal and external clinical meetings.

Jayne has contributed to Imperial College Tissue Bank, RADICAL trial samples and data, and routine health records but she has access only to her own clinical records. Healthcare staff can retrieve material they need for their job, and some staff have research roles giving them access to datasets related to the institutional tissue bank or to clinical trials, which also sit independently. Governance of research data requires that every tissue sample and related data can be tracked in both directions—back to the patient and forward to the analysis—to ensure research integrity. Being trackable does not mean that data remain attached to their source, and indeed materials are de-identified and stripped of personal markers before use. Tracking is achieved through an allocated identifier which circulates inside a research setting without enabling individuals to be identified. However, researchers often want further samples from or information about their donor for which they rely on intermediaries who can re-identify and re-attach patient samples to the identifier. Where relevant, researchers also feed their results back to senior clinicians who will re-identify individuals if they consider findings clinically relevant. This 'airlock' process enables only a few people with specific job roles to 'unlock' pseudonymisation and transfer data into and out of research environments.

Walled Gardens

Jayne's data and samples reside in three repositories—the Imperial College Tissue Bank, RADICAL trial samples and data, and health records—which are walled gardens, albeit of very different dimensions, and they are insulated from each other by formal techniques of governance and access.

Jayne had little interest in remaining anonymous, protected by walls that also excluded her. Her questions about what happened to her data might provide a way, she said, of "turning my misfortune into a positive", that is, generating research findings that would help future patients. She wondered about the value of her monthly blood donations and multiple scans during more than three years on the RADICAL trial: "It would be wrong to expect a cure to come out of my samples, but something…" because, in her view, the trial drug had worked. Jayne was most interested in her tumour samples. She described the removal of a fungating tumour in her first operation and explained with pride how the research technicians waited for a blood sample so it could be couriered together with the tumour to the laboratory. In an interview just before we visited that laboratory, Helen asked, "Have you any idea what they've done with your tissue?" Jayne replied, "… As I mentioned in my speech to the people at the ECMC[6] or whatever it was... this fungating monstrosity, we nicknamed it Grumpa-Loompa.[7] We've always referred to is as Grumpa. I said to her (my sister), 'I'm going to the lab today.' She said, 'I hope Grumpa is not there looking at you in his jar.'" It was through Grumpa that Jayne figured herself as a gardener who had cultivated this tumour unwittingly alongside her everyday occupation. After contributing to various walled gardens in the hospital and university, she thought that her cancer and the tissue samples it provided for other gardeners constituted

[6] ECMC: Experimental Cancer Medicine Centre, a network of cancer research centres in the UK. Jayne had given a talk to one of their meetings about her experience.

[7] Based on the Oompa-Loompas from Roald Dahl's Charlie and the Chocolate Factory. https://en.wikipedia.org/wiki/List_of_Charlie_and_the_Chocolate_Factory_characters#The_Oompa-Loompas. Jayne and her sister seem to have associated these figures with their small size, incessant factory work, and mutable, mischievous, improvisational qualities rather than the imperial and racist tones that many have perceived. These qualities resonated with their perceptions of embodied breast cancer.

a unique learning opportunity. As she suggested during the lab tour described below, 'I don't want to be big-headed about it. I think I was a bit special when I started because it was so advanced when I presented myself… I think there was a lot of interest in my tumours and me I suppose because of that. [My friends with cancer] haven't had anywhere near as much interest in them as I have, they've felt a bit factory, conveyor belt type thing'.

Walled Garden 1: The Tissue Bank

From 2013 to 2018, Jayne provided samples to the Imperial College Tissue Bank, which is licensed by the 2004 Human Tissue Act[8] to collect samples with permission for research. When patients donate to the tissue bank, they consent to participate in unspecified research rather than particular studies, and today, they generally provide enduring consent for research use of surplus samples from continuing health care investigations. Samples sit within a walled garden and can only move outside the institution through a material transfer agreement or an existing site license for collaborative research with appropriate data sharing agreements. Researchers apply to the tissue bank to use samples in specified studies within a given time frame—usually for the exploration of emerging questions in basic laboratory science but also in research training or for testing equipment. As far as laboratory researchers are concerned, tissue banking governance provides the flexibility to ask and explore preliminary questions.

Research technicians provided integral, albeit informal, support during Jayne's many hospital appointments from 2013 to 2018. They also constitute an interface between the service and research but, before 2018, it was not considered appropriate to open this conduit to Jayne herself or indeed to Sophie and Helen except in very partial ways. It was after Jayne

[8] The Human Tissue Act (2004) came into force on 1 September 2006 and legislates on the use of human tissue samples. It established the Human Tissue Authority (HTA) to regulate activities concerning the removal, storage, use and disposal of human tissue samples for defined Scheduled Purposes, including 'research in connection with disorders, or the functioning of, the human body'.

stopped contributing regular samples that Kelly Gleason, Senior CRUK[9] Research Nurse at Imperial College London, organised a visit to a laboratory that had worked with Jayne's tissue bank samples; she invited the three of us to join the tour.

The laboratory group were studying the epigenetics of evolution in hormone-positive breast cancer. Their work relied on repeated samples from the same individuals who had received neither surgery nor chemotherapy. As the head of the laboratory confirmed, these series of samples were 'as rare as white flies', and therefore 'golden' or 'precious'. Since Jayne had initially declined surgery and never undergone chemotherapy, hers were among the small number with which this laboratory group obtained the DNA fingerprint of tumours over a period of one to two years—before, during and after endocrine treatment. They tried to establish what counted as the same or different types of tumour by assessing genetic heterogeneity and asked what made some tumours start to grow again.

During our visit, we learned how tumour samples arrived in dry ice by courier. Close liaison between laboratory staff and clinical research technicians was essential because the samples had to be used immediately in the research. We were shown some of their techniques and tools, including live cell lines of breast cancer from Sister Catherine Frances, a Catholic nun who developed metastatic disease in the chest wall and pleura in 1971. Cells from her pleural effusion were the first to be successfully cultured, and her MCF-7 cell line has led to over 25,000 published reports (Lee et al. 2015). Sister Frances' cells were oestrogen-receptor (ER) positive like Jayne's, and subsequent research using this cell line led to major advances in therapy including tamoxifen and aromatase inhibitors.

Material from serial biopsies has improved understanding of the mechanisms of tumour evolution in ER-positive cancers under selective pressure from aromatase inhibitors (Patten et al. 2018; Rosano et al. 2021). Related studies (see Viney and Day, this volume) have explored cell-free circulating tumour DNA in blood samples for biomarkers that may improve prognosis and suggest earlier interventions (Magnani et al. 2017;

[9] Cancer Research UK is the world's largest independent cancer research charity, funded almost entirely by public donations.

Hong et al. 2019; Coombes et al. 2019). Such 'liquid biopsies' offer huge advantages over solid tumour biopsies for the monitoring of disease since they are relatively easy to give as well as to receive, process and store (Hastings et al. 2021). At the end of the visit, Jayne was in conversation with the head of the laboratory who said that he 'did not have green fingers' and wasn't a gardener. She replied that the work he had shown us in the laboratory suggested that he had all the skills and could also be a gardener, if he put his mind to it.

Jayne was much more interested in the uses and values of her tumour samples than the 22 blood donations we found that she had also made available for research through the tissue bank. An audit in 2019–2020 showed that Jayne had provided an unusually large number of samples. Four hundred and seven people each provided between one and twenty-six samples with an average of between two and three; only nineteen people provided ten or more samples. The audit showed that these samples were explored in collaborative research with Sweden and the USA, for example, as well as in the UK.

Walled Garden 2: RADICAL Trial

Exploratory studies using tissue bank samples sometimes lead to proposals for clinical trials. Trials require specific approvals and consent from participants since they involve 'investigational medicinal products' such as drugs or devices.[10] They require meticulous record-keeping including the validation of all samples and results in protected databases.

Research technicians were responsible for recruitment and follow up to the RADICAL trial under the institution's Cancer Clinical Trials Unit. Jayne's monthly blood samples were spun and stored in a RADICAL freezer. The samples were managed thereafter by the Clinical Trials Unit at a site nearby. The technician responsible for RADICAL from 2017 to 2018 explained how she entered results and data onto an *InForm* ITM (Integrated Trial Management) System, which is used widely in the pharmaceutical industry and charity sector. This 'walled garden' includes data

[10] Medicines for Human Use (Clinical Trials) Regulations (2004).

imported from several hospital systems. A technician manually extracted material from the hospital service data system to combine with reports from trial participants and results from separate imaging and neurology systems before collecting signatures from clinicians for the site file. These data were audited on conclusion of the study and archived. Only then, in 2018, did Jayne's blood become accessible outside RADICAL and, as far as we could discover, samples stored at the drug company labs[11] were returned to the local centre to be either destroyed or repurposed for other studies.

Interviewing the principal investigator (PI) of this study, Sophie learned that cancer prognosis was worse when fibroblast growth factors, particularly FGF2 (fibroblast growth factor number 2), become elevated. His group investigated molecular mechanisms *in vitro*, then in animals and eventually in people affected by a range of cancers who had become resistant to treatment with letrozole or anastrozole. The group developed a blocker to FGF2 called AZD4547, which they hoped would overcome resistance to treatment. After a pilot study, they trialled the compound in combination with letrozole or anastrozole and reported subsequently that about one-third of participants benefited (Seckl et al. 2017). The research programme then stalled because the group were unable to stratify participants ahead of treatment: 'we need to know how to select those patients [who will benefit] and not the ones for whom it doesn't work, and currently we can't do that. There is a test which gives you results before imaging can, within a few weeks of starting treatment, but it would be better to know before you start treatment. That is tough. … If we could select patients properly, we could do a bigger trial and properly answer whether this inhibitor works or not' (field notes, 2019). This next step of stratifying patients and selecting only those who might benefit from the treatment required either serial biopsies, which they did not have, or appropriate surrogate markers.

Financial issues may also have contributed to the hiatus in this research programme. Interviewing the first research technician responsible for the study, Sophie heard that the trial drug was 'on the shelf' until researchers made different combinations available for trial across a greater range of

[11] The RADICAL trial involved the company AstraZeneca https://tinyurl.com/y54z34gz

cancers, thus defining a larger potential market for anything that might be licensed. A colleague also suggested that participants suffered too many side effects for the company to adopt the treatment in early (as opposed to late) breast cancer, which was their only financially viable option because it would include a larger number of people.

When Jayne heard this news, she was unsure whether her donations had been useful but remained convinced that she benefited personally from her 46 cycles of treatment. In addition, she felt she had profited from the close monitoring and incidental findings that were shared. At her first diagnostic appointment in 2013, possible signs of cancer were mentioned in Jayne's lungs, liver and pelvis. Eventually, a consensus developed that there were four small cancerous nodules in Jayne's lungs while RADICAL trial monitoring suggested that there was no cancer in her liver, just fatty cysts. A torn retina was also found and repaired 'then and there'; subsequently, an issue about drainage in her eyes was treated in the hospital, which Jayne understood might have caused glaucoma if left untreated. Jayne also felt that she would not have been recommended her second mastectomy in 2018 had her clinicians not been involved in research, since the tumour was so small—only 15 mm—when it was discerned.

Sophie and Helen learned that Jayne would receive formal notification of trial results when they became available if she had requested them in her original consent form. The trials unit told us that the results were still being analysed at the beginning of 2020 and referred us to a key summary on the CRUK website. Here, the investigators report that the trial showed that AZD4547 combined with one of two aromatase inhibitors appeared to be safe and showed anti-tumour activity in some people.[12] Trials are underway to explore whether results can be improved by selecting patients with specific biomarkers who may benefit most from the drug combination (Tarantino et al. 2020). Jayne hopes that the work will continue.

[12] https://www.cancerresearchuk.org/about-cancer/find-a-clinical-trial/a-trial-of-azd4547-for-breast-cancer-that-is-oestrogen-receptor-positive-got-worse-despite-having-anastrozole-or-letrozole-radical#undefined

Walled Garden 3: Patient Records

Jayne's patient records contain traces and links to most of the research activity described above. Clinical consultants recorded decisions in her notes after reviewing the results of tests through which her health and response to the RADICAL trial treatment were monitored. Paper patient records have long been used in hospitals and other clinical settings, and, in recent decades, test results that were stored in electronic form were also printed to add to a patient file. Initially, Jayne had a paper record which contained copies of letters, results, procedures, treatments and clinical notes. She said that her file became so large and heavy that staff would have to use a bag to carry it. Although her paper records contained an enormous amount of detailed data, they were not shared outside the hospital and so were largely inaccessible for research, audit or to Jayne herself. In 2016, the hospital introduced an electronic health record (EHR) system hosted on a platform run by the company, Cerner. Clinicians involved in patient care can view these records in the same way as previous paper records. The system links to other local health records (see below), and Jayne now has some access to these through a patient platform called the Care Information Exchange; Jayne can look at her recent results, add comments and upload data from health trackers. She explained, however, when hospital care was radically curtailed in 2020 that she did not want to receive any results by phone or electronically, only in person.

A Changing Landscape: from Walled Gardens to Data Flows

The figures of the gardener and of Grumpa have evolved in relation to their grounds, the walled gardens. Rapid developments in data collection and the increasing interoperability of data systems mean that traces of Jayne in her data and materials are now embedded in much larger warehouses. Both data and samples may appear to have "disappeared anonymously into an abyss of data" but they are also contributing to the creation

of value in the UK's life sciences strategy to build assets from unique NHS data sets. The gardener and Grumpa are valued as "pluripotent" elements for future research with these datasets.

Although Jayne's materials sit in three and no doubt further walled gardens, some people can travel between them, including research technicians. Given appropriate consent, excess samples can also be repurposed for subsequent research, and clinically relevant information shared. Jayne, for example, consented to the collection of 'archival tissue samples' in RADICAL for exploratory work via tissue banking to look for markers that might influence the development of breast cancers or help explore patient responses to treatment. From 2013 to 2020, the ways that data are collected, stored and used were transformed in health services and research. EHRs such as Cerner enable easier reporting and sharing of data, and NHS investment in these EHRs "supports our wider interoperability strategy and avoids the 'walled garden' legacy of trapping data in institutions" (Swindells and Smart 2017), simultaneously contributing to core UK government strategies aligning health, life science and economic policies (Department for Business, Energy and Industrial Strategy, 2017).

In the local NHS Trust where Jayne is a patient, a Whole Systems Integrated Care (WSIC) database is now extending this infrastructure (Bottle et al. 2020). A researcher who has been closely involved in its development explained: "[it] is currently used for direct patient care, service evaluation, commissioning and for research [through the system known] as 'Discover'. For direct patient care, the WSIC team developed disease-specific dashboards, which can be accessed by healthcare professionals with a legitimate relationship with WSIC. For other uses, the database is de-identified" (interview, 2020). This single integrated care system in North West London contains data on 2.4 million people and can be used by clinicians to support the provision of care, by managers and auditors to review activity as well as generating statutory reporting, for example on cancer waiting times. A pseudonymised form of the database (Discover) can also be used for research, and patients who have consented to be contacted for further research can be re-identified if they meet a study's inclusion criteria (Fig. 8.1).

Since 2020, developments in the collection, storage and use of health data have further intensified in response to the COVID-19 pandemic.

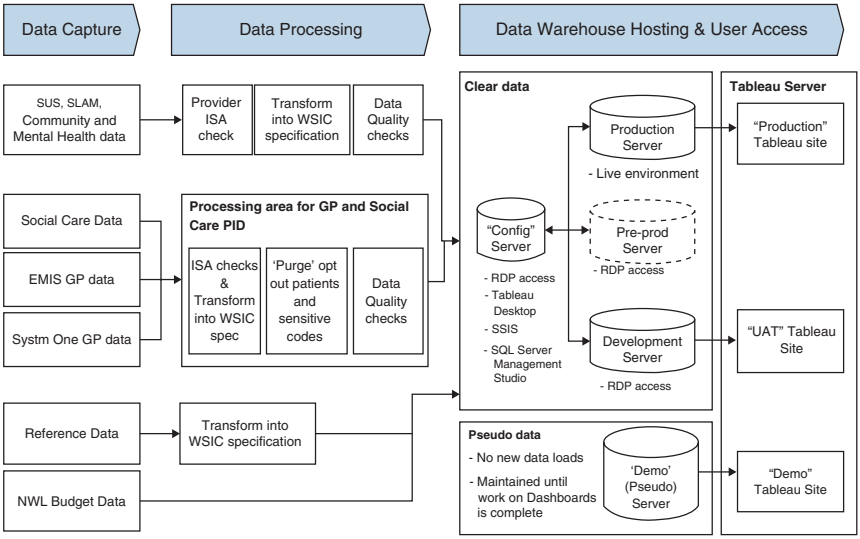

Fig. 8.1 Walled gardens of data: links across the local health sector used to create the Whole Systems Integrated Care database; Figure reproduced from Bottle et al. (2020), under Creative Commons Attribution 4.0 International License

A researcher we interviewed explained how the use of individual and group-level patient data "has been even further facilitated due to COVID, in a way, in that we've accelerated development of a virtual platform that our researchers can access, and we'll have access to anonymised EHR data from Imperial College Healthcare Trust" (interview 2020). The WSIC platform has also been used to track COVID-19: people who use the Care Information Exchange are invited to provide weekly updates on whether they have experienced symptoms, and they can respond to other surveys about their care and preferences, for example, relating to a contact tracing app (Bachtiger et al. 2020). Jayne has participated and found it interesting, indeed unusual, to be invited to provide a written ('free text') account of the impact of COVID-19 on her experience of cancer services.

These larger data warehouses are not alternatives to the walled gardens described but rather a larger garden: "The technical solution comprises a 'walled garden' approach, which uses secured virtual sessions run from within a secure infrastructure. … All projects are logically segregated

from each other within the safe haven, and access is controlled and permitted only to those users who have been registered and attended information governance awareness training courses, as well as completed online information governance tests annually for their reaccreditation" (Lea et al. 2016).

Data developments associated with EHR, WSIC and Discover mean that Jayne's data can be aggregated with millions of other patient records in a way that was not possible five years ago. Data produced from her care—the details and dates of her diagnosis, test results, treatments, visits, etc.—also link the hospital she attends and primary care (UK general practice). A clinical researcher explained how this infrastructure enabled approaches other than traditional clinical trials, "(we) have moved on, beginning to see the utility and using e-health data and electronic health record data, rather than collecting vast amounts of information on patients that we recruit to studies. And how we can really make the best use of that information, to do almost quasi-experimental or natural experimental designs, and improve patient outcomes" (interview 2020). They provided examples showing that this approach can occur in near real time with the introduction of alerts, for example, to a patient who may have sepsis. They can then assess whether alerts led to any improvement in outcomes (Honeyford et al. 2020).

As Jayne cautioned, however, data that is readily available in large quantities is not necessarily any more reliable. She said that letters to her general practitioner (GP) in her medical records had multiple errors including incorrect dates for her scans and her most recent treatment. The very size of these linked data sets "does not eliminate and may even amplify systematic error" (Ehrenstein et al. 2017), which can undermine their usefulness even if the greater scrutiny may also reduce errors.

In sum, our investigations found traces of Jayne's history of treatment and research participation in clinical records in both identified and de-identified form, in paraffin blocks and serum samples in banks that are kept for 20 years, in DNA sequences and in research results and papers. Sophie and Helen were able to explore three 'gardens' in depth and found that Jayne and other patients have provided materials for local research in surgery, a spectroscopy study associated with cell biology and drug delivery systems, other types of cancer including metastatic cancers, a

xenografting study with doubled systems of consent because it involved animal work, PhD projects through specific consents and through the tissue bank. Along with samples from other patients, Jayne's contributions have informed several research papers as well as our own research on the impact of developments in cancer medicine (Day et al. 2017, 2021; McGrath-Lone et al. 2015). We did not find out about derivative uses in further studies such as those repurposing clinical trial bloods.

Grumpa

Jayne thought her involvement in research and care was "all of a piece really" because of the collaborative focus on cultivating Grumpa, whether attached to or detached from its host. As Jayne wrote in her letter (above), "In the 'Garden' analogy, to me my breast cancer is a unique hybrid plant I have grown, which has been taken for propagation into a walled garden to which I have no access. … Did it end up on the bonfire? In the compost? Were seeds/cuttings taken? etc".

This figure, Grumpa, was delineated collaboratively over a period of six years by several other gardeners as well as Jayne. Staff in the hospital and university sensed the cancer differently in the clinical trial, the laboratory research programme and during Jayne's continuing care. 'Cuttings' were taken for research from Jayne's initial diagnostic biopsy in 2013 and shared. In 2015, Grumpa was distributed again following a lumpectomy and a mastectomy, and once more after another mastectomy in 2018. Relational, comparative and perspectival glimpses (Gal 2016) across at least some of these walled gardens constituted scaling devices which put together a history to Grumpa—and care plans and prognoses for Jayne. But, as the gardener, the one who produced and grew Grumpa and made all the collaborative work across cancer care and research possible, Jayne felt that she had been excluded from the results of this work and their potential relevance for breast cancer care more generally. The history to her 'cuttings' was outside Jayne's control and practices of governance also made it very difficult to effect a comparative history across 'trusted research environments'.

RADICAL trial results from patients with a range of cancers were analysed as a combined set after the trial closed. Jayne was one of many contributors and her Grumpa samples seemed to have "disappeared anonymously into an abyss of data…". Investigators were also frustrated that they could not differentiate between participants and select only those likely to benefit from the trial drug. Since cancers affecting different individuals respond to treatment and other evolutionary pressures in different ways, it is difficult to conduct clinical trials as though the indexicality of data is uniform and stable. By comparison, the exploratory epigenetic research conducted by another research team was more of a 'natural' experiment, rather like the new uses of linked data made possible by the WSIC database. Some materials remained indexed to Jayne over time even though they appeared to have been detached from her continuing care. Sophie and Helen's detective work showed that information travelled between the clinic and this laboratory group and that developments in one environment were understood in relation to the other—her clinicians were also active research investigators. A natural history of tumour evolution was constructed by integrating the results of clinical observations with laboratory and data research to track the evolution of cancers.

We were all struck by the 'immortal' cell line from Sister Frances and Jayne explained how she would love to find that her samples had been similarly important: "Given the opportunity, I would love to reveal myself as that 'gold' patient and find out how my samples were used and whether they were instrumental, even in a tiny way, in any breakthrough in the treatment of breast cancer." This cell line evokes a traceable continuity from donation to discovery that is rare, but recognisable. It reminded Sophie and Helen of research using HeLa cell lines, developed from a sample taken and used without consent or knowledge from Henrietta Lacks. This history is extensively documented as a history of racial and economic abuse that has become well known through the book and film *The Immortal Life of Henrietta Lacks* (Skloot 2010), which depicts the extraction of value without compensation. Jayne considers the (con)figuration of her samples in more positive terms. Her materials have not been used for *in vitro* cell lines (for which specific permission would be required), but the laboratory team clarified that rare, repeated

samples such as hers were of substantial value to research into the evolution of hormone-positive cancers exposed to treatments *in vivo*.

The contrast between the two types of cancer research we have described, a clinical trial and a laboratory programme informed by clinical observations also indicate multiple ways of being cut out of or included in prognoses. Jayne considered that her care benefited directly from research involvement. Like many other people, she hoped to improve the lives of future generations just as previous generations had contributed to her own wellbeing: 'if I've got to have this awful disease, at least it can do somebody else some good. It's made me feel better about it.' Benefits of building on historical legacies from generations of people affected by and working with cancer[13] are commonly indexed to a distant collective future. But Jayne found that her research involvement was continuous with the ongoing care, personal and "near futures", what Jane Guyer calls a sedimented, cumulative sense and experience (Guyer 2007).

Describing the research uses of Jayne's samples is "to speak of a distributed, heterogenous thing" (Landecker 2000) which will likely continue to change. It was Grumpa, we suggest, that constituted the key figure driving liaison between Jayne, cancer services and research to explore and respond to its evolution. Staff were aware of what is called clonal evolution, describing distinct subpopulations of cells that emerge.[14] Most models consider that driver mutations and medical therapies represent important triggers in the environment that prompt adaptations. The Grumpa figure from which cuttings were taken enabled inferences to be made about developments in this adaptive landscape and enrolled the labour of clinical and research staff as well as Jayne herself. Preliminary findings raise the possibility that the "metastatic cascade" in hormone-dependent breast cancers is associated with chance epigenetic events rather than the clonal evolution characterising these cancers at an earlier stage before treatment (Rosano et al. 2021).

[13] See Guyer's (2007) reconsideration of the gifts described by Marcel Mauss that can only be returned indirectly across generations.

[14] Davis et al. (2017) note that in a cohort of 104 triple-negative breast-cancer (TNBC) patients, resolving subclones with deep sequencing identified 1 to 19 subclones per patient (Shah et al. 2012). Another study used multi-region sequencing of 50 breast cancers and identified only 1–4 major clonal subpopulations in each patient (Yates et al. 2015).

Conclusion

Classifications, treatments and knowledge change at different rates as they index possible futures in care and research. Jayne's questions about her data and samples led us to ask how her materials shaped several, more or less heterogeneous but interconnected forms of person and cancer, care and research. Jayne saw her stuff '*disappearing anonymously into an abyss of data*' in a study that in her view also saved her life while developing a 'unique profile' in a study of cancer evolution where her *golden samples* might also inform continuing care. Fortuitously, the figure of the gardener, as a moniker for a person whose identity could not be shared across settings, allowed us to begin to 'figure out' processes that were connected in some ways and separated in others. However, it is the second figure of Grumpa, the cancer that lived with Jayne and yielded cuttings and seeds, that elicited collaboration among the authors as well as healthcare staff and researchers. Grumpa, distributed to various walled gardens, brings together the experimental and observational, care and research, the personal and impersonal, and the singular and plural as it changes in response to its surroundings, which are also changing.

Helen Verran (2010) describes two forms of generalising, where a one-many relation embeds or abstracts a 'case' such as ours as an example of something in general while a whole-part relation makes the history an emergent entity in a vague whole, whose parts will never add up to a complete picture (Verran 2010; Winthereik and Verran 2012). In Verran's view, there is an irreconcilable tension between these forms of generalising that demands a double vision. Sophie and Helen did not trace clear outcomes from Jayne's participation in research, nor any typical trajectory for those involved in an experimental cancer care combining data-intensive, laboratory and clinical research with health care. We (three) did not find how Jayne's data—stored, sometimes aggregated with others, and analysed—were applied in care settings or further scientific studies. However, describing this collaboration from 2019 to 2020 in terms of figures produces aspects of one-many *and* whole-part generalisations within a constitutionally incomplete picture of many moving parts.

Despite what was in Jayne's view a disappointing lack of closure, that is, the lack of a 'eureka' moment to our investigations, she concluded after discussing a draft of this chapter that her story and our combined figuring might encourage discussion between staff and patients about research that would "turn" what it figured (Haraway 2008:159). The small audit conducted by research technicians was conceived in similar terms: when results were shared, might they promote discussion and engagement with research and tissue banking, as suggested in published studies? (Bryant et al. 2015). Jayne wrote, "The process of contributing to research is a positive incentive, and makes you feel a bit more special and supported. However, don't be under any illusions that your contribution will, on its own, be responsible for any 'Eureka' moment - it is still an unidentifiable drop in the ocean. But without all the drops there would be no ocean".

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9

Data Through Time: Figuring Out the Narrative Self in Longitudinal Research

Jane Elliott

Introduction

How might we describe and make sense of an individual's life? Is it best understood with reference to their accomplishments, family life, voluntary work and career—elements that might be narrated in a eulogy at their funeral? Or would this account miss the texture of their daily experience, the habits and routines that form the constant backdrop to these events? We now have substantial data resources from longitudinal studies that have tracked large samples of individuals over many decades. We also have myriad and increasing opportunities for tracking and recording our own daily lives and the lives of others. How might we extract and combine this information to understand, and potentially improve, individual lives?

This chapter has two parts. The first briefly explores the ways in which individuals have figured within longitudinal research in the social

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sciences and highlights an emerging set of methods focused on reconstructing individual cases within quantitative longitudinal research. The second is partly inspired by recent literature that emphasises the importance of attending to the mundane, the routine and the everyday (Highmore 2004, 2011; Pink 2012; Back 2015; Neal and Murji 2015). Specifically, I raise questions about the implications of the digital revolution (and in particular the self-tracking movement or 'personal informatics'), for future research practices within longitudinal studies. It is now possible for detailed information to be collected in real time on individuals' habits, behaviours and vital signs (Lupton 2016; Neff and Nafus 2016). This potentially provides researchers, and individuals themselves, with material that can be used to develop a different type of understanding of a life—one that focuses more on routine, lived experience and the practices and habits of daily life.

The thread that binds these two halves is the suggestion that it is instructive to think through what can be considered as 'figure' and 'ground' in our research, and in our representations of individuals' lives. The metaphor is apt, partly because of the long sociological tradition of trying to understand the individual (or figure) in social context (the ground) without unduly privileging either the agency of the individual actor or societal structures and constraints (Mills 1959). It may also have renewed utility as we try to 'figure out' what it means to be an individual, and to lead a worthwhile and fulfilling life in today's digital society. In particular, we could more easily conceive of figure and ground in temporal terms. Perhaps the 'ground' are the routines of daily life which, by definition, pass by almost unnoticed, while the figures are the events and experiences that loom large in our memories and our narratives about ourselves. Indeed, could a better understanding of the 'ground' of the habits and rhythms of our quotidian existence provide the key to understanding how to lead 'better', more fulfilling, lives?

In order to explore these questions I draw primarily on exemplars from Britain's portfolio of national longitudinal studies of individuals' lives. These include the long-running household panel study, known as "Understanding Society" (Buck and McFall 2011), together with the set of world-renowned cohort studies that have followed thousands of individuals from their birth (in the spring of 1946, 1958 and 1970

respectively) through childhood, adulthood and middle age (Power and Elliott 2006; Welshman 2012; Pearson 2016). As will be discussed below, these studies provide an instructive case study because they have been used by a wide range of researchers from different disciplines. This includes novel uses of the data to reconstruct or "refigure" individuals (Sharland et al. 2017, Tinkler et al. 2021; Carpentieri et al. 2022; Waller et al. 2020).

Section 1: Longitudinal Studies and Quantitative Representations of Individuals' Lives

Some of the earliest longitudinal studies were carried out in the United States in the early twentieth century and focused on understanding children's development (Phelps and Colby 2002). However, Britain is unique in the world in having a portfolio of four national birth cohort studies that have followed individuals, born in a specific year, through childhood, and into adolescence (Pearson 2016),[1] and adult life (Wadsworth et al. 2006; Power and Elliott 2006; Elliott and Shepherd 2006). A key feature of longitudinal research is that by maintaining contact with a large sample of individuals, and re-surveying them, typically every five to ten years, throughout their lives, it is possible to build up a rich and detailed record about the experiences of each member of the study. This is a type of quantitative life story, addressing many different aspects of each cohort member's life. These include their education, childhood experiences, employment, housing, relationships, fertility, social participation and physical and mental health (Ferri et al. 2003; Wadsworth et al. 2006; Power and Elliott 2006; Elliott and Shepherd 2006).

[1] Indeed, the UK also has a number of cohort studies based in specific areas of the country, for example, the Avon Longitudinal Study of Parents and Children which started in the early 1990s and Born in Bradford. In addition, the UK has one of the largest household panel studies in the world, the UK Household Longitudinal Study. The arguments made in this chapter apply equally to any longitudinal study that focuses on individual lives through time but the focus will be to use the 1958 cohort study as an exemplar.

The ability to follow the development of individuals throughout their lives has an inherently appealing, narrative quality (Elliott 2008). Indeed, parallels can be drawn between the 1958 cohort study and Michael Apted's popular long-running documentary 'Seven Up!'. This has followed a much smaller sample of just 14 individuals from when they were 7 years old in 1964 (Burawoy 2009; Thorne 2009).[2] The original premise for the series of documentaries was the Jesuit adage: 'give me a child until he is seven years old and I will show you the man'. Apted deliberately chose children from contrasting social class backgrounds in order to see how material circumstances impact on individuals' aspirations and life chances (Willis 2009). The British Birth cohort studies have also focused on inequality and on understanding the extent to which poverty and deprivation prevent individuals from realising their potential (Wedge and Prosser 1973; Wedge and Essen 1982).

However, in contrast to Michael Apted's documentary approach, the majority of information collected in the British Longitudinal Studies is highly structured or quantitative. Therefore, its analysis typically involves the estimation of multivariate and longitudinal models. These focus on associations between different variables, and identifying which *factors* have the greatest impact on an outcome of interest later in life. The models produced, typically populated by columns of coefficients and standard errors, can seem a far cry from stories, or narratives, about real human beings (Elliott 2005).

There is therefore a sense in which the cohort members themselves are obscured in the quantitative analyses that characterise the majority of work carried out using data from these studies (Elliott 2005, 2008). As Armstrong (2019) has argued, "Ironically just as these data points could claim to reveal a new numerical description of the individual, their combination and comparison … involved choreography of data points quite separate from the individual" (p. 110). In other words, we risk losing touch with the uniqueness and complexity of individual lives as these are represented as sets of summary variables that can be manipulated by the epidemiologists, economists, psychologists and sociologists who use the

[2] Apted (who sadly died early in 2021) was sometimes called a "Longitudinal Documentarian" (Thorne 2009).

datasets. And we lose touch too with the ability of individuals to reflect on their own lives and, perhaps, to compare them with those of others. It is rare for cohort members to be given a voice and enabled to reflect on their own experiences.

One exception to this is a qualitative study conducted with a subsample of 220 members of the 1958 cohort between 2009 and 2010 (Elliott et al. 2010). Individuals were asked about their communities, social participation and weekly routines as well as being given an opportunity to tell their own life story. At the end of the interviews, cohort members were also asked about their experiences of being in the study throughout their lives (Parsons 2010). Many had positive memories of how it had made them feel 'special' in early life to be part of a study that would be useful to wider society. However, there was also a desire among some study members to receive more feedback about the study in the form of case studies and stories about other cohort members. As one cohort member said:

> *I think most of the feedback that comes back is very, very generic which--, I tend to get bored halfway through reading so I don't bother…maybe some examples, some, I don't know, common case studies, stories, that sort of stuff would make it more interesting and I'd read it then.* [Interview 239] (From Parsons 2010, p. 15)

It is perhaps too strong to claim that individual cohort members actually disappear in the multivariate statistical analysis of their data. Rather they provide an essential background, contributing to the mass of data points from which statistical models are estimated. Whether we are researchers or readers of research findings, we know that the individuals are there. It is the representative nature and large size of the sample that ensures the statistical models are credible representations of underlying processes in society (Hawkes and Plewis 2006; Mostafa et al. 2020). Even so, the intense focus on variables in multivariate analyses means that the agency and reflexivity of individuals are likely to be obscured (Abbott 1992). In the quantitative, multivariate, longitudinal models that capitalise on the detailed prospective information in the cohort studies, it is the

coefficients that populate the models which *figure,* while the cohort members themselves provide the 'ground'.

Set against this, the relative invisibility of individual study members has the advantage of protecting the anonymity of those who have contributed a great deal of very personal, and sometimes sensitive, data throughout their lives. In contrast, in Apted's '*Seven Up!'* series the individuals are the key figures in the documentaries. Indeed these individuals have taken on an almost celebrity status.[3] However, this level of visibility has led some participants to opt-out. Five of the fourteen participants have declined to participate in at least some of the updates over the years. For example, Charles, recruited for the documentary from an elite public school, dropped out after 21 Up and has never returned; whereas Peter dropped out of the series after *28 Up*, following a campaign against him in the tabloid press due to his criticism of the Conservative government during his TV interview. He returned to the series for *56 Up* in order to publicise his band.

Reconstructing the Individual Within Longitudinal Cohort Studies

Despite the tendency of longitudinal studies to obscure the individuals who take part in them, there are a few examples of research which do take a more individual case-based approach. These studies recognise that the detailed and temporal nature of the studies, and the location of cohort members in a specific historical context, mean that the studies have considerable narrative potential (Elliott 2005; Elliott et al. 2010; Waller et al. 2020).

Indeed, a number of researchers have adopted imaginative methods which in some senses reconstruct the individuals who have been fragmented into a set of variables so that those who were in the background come to figure. For example, Singer et al. (1998) use the Wisconsin

[3] When Tony Walker (one of the participants) was interviewed about the death of Michael Apted on the BBC Radio 4 Today programme on 9 January 2021 (8:48 a.m.), he was treated as a celebrity by the interviewer, who asked questions about what the study had meant to him, thanked him for his contribution and said, 'Many of us feel we know you'—Tony replied by simply remarking 'I thought it was about Michael'.

longitudinal study to understand more about the factors that can lead to depression for some women. They use different waves of the Wisconsin study (many years apart) to piece together individual life stories for a small sub-sample of individuals. Singer et al. argue that "new insights are obtained as detailed information about real people are brought into focus" (Singer et al. 1998). These insights can then be used to generate hypotheses, which can in turn be tested using statistical models.

A recent paper, drawing on this approach, has used data from the long-running British Household Panel Study to construct case studies of families who have been supported by social workers (Sharland et al. 2017). A key aim was to explore whether this more narrative methodology, focused on the lives of individual families, would provide insights into a counter-intuitive finding emerging from statistical analysis. Namely that families who have contact with social services have *poorer* outcomes than families in similar circumstances without support. In the authors' words "In the absence of complementary qualitative material, quantitative life histories seemed worth trying, to catch a glimpse of the stories beneath the aggregates" (Sharland et al. 2017 p. 670). Sharland et al. are understandably tentative in their advocacy for this method, based on its limited use to date. However, they conclude by arguing that given the impressive array of quantitative longitudinal studies in the UK, the USA and Europe, researchers might make better use of the "largely untapped narrative potential that may enrich our understanding of how lives unfold. The quantitative life history narrative method offers a chance to realise this potential" (Sharland et al. 2017).

Very recently, in the UK, two separate historical studies have adopted similar techniques and risen to this challenge. Peter Mandler's study on the history of secondary education since 1945 includes the creation of 150 pen portraits of cohort members from the 1946, and the 1958 cohort studies in order to understand more about the family backgrounds, educational and occupational trajectories of two separate generations (Carpentieri et al., 2022). The *Girlhood and Later Life project* led by Penny Tinkler focuses on girls growing up in Britain in the 1950s to 1970s. The team uses materials from the 1946 British Birth Cohort study (known as the National Survey of Health and Development (NSHD)) to reconstruct biographies of women from different education and class

backgrounds, in order to understand more about their opportunities and life courses. As they write: "we can do more than generate statistics from birth cohort studies such as the NSHD; we can also recompose persons. The crux is how we understand data and persons. Recomposition entails scavenging for various (including unrecognised) data, and combining them to generate biographical collages" (Tinkler et al. 2021).

These studies provide examples of ways in which individuals, who are usually expected to fade into the background within large-scale studies can be re-configured or re*figured* by researchers who have an interest in documenting the experiences of individual cases. Indeed, what makes the cohort studies a compelling resource for this kind of work is that the large sample size makes it possible to select very specific cases for analysis and to understand those individual lives in context of the much broader sample.

It is noteworthy that historians are prominent in the cadre of researchers who have started to use the cohort studies in this new way. Case studies of individual cohort members provide insights into the past, and their prospective nature means that, in contrast to the use of oral histories, there are fragments of detailed information collected contemporaneously. In these uses, while it is individuals who figure they are primarily of interest for the insights they provide into the broader historical picture, the experiences of going to a Grammar School or a Secondary Modern School in Post-war Britain, or the different opportunities perceived as available for boys and girls. As Tinkler et al. reflect, "Recomposition is … interested in the singularity of individuals, it attends too to the historical and relational embeddedness of personhood" (Tinkler et al. 2021). The particular appeal of these case studies is perhaps that we can gain some sense of the 'big stories' of individual lives. We can look for continuity and change in circumstances over many decades, and we can gain insights into the childhoods and young lives experienced half a century ago.

Big Stories and Small Stories

The focus in both conventional multivariate analysis and the relatively recent work on the re-composition of individuals within longitudinal studies leaves us with another question or conundrum—namely what are

the best ways of documenting and understanding individuals' more quotidian experiences? This question highlights an interest in understanding figure and ground in a more temporal sense. When we recount our own life stories or compile a CV we focus on key *events*, experiences or transitions—the dates of birth of children, when we changed job, or moved house. Indeed these are also the key pieces of information documented in many longitudinal studies about peoples' lives. It is these events that 'figure' in our lives against a backdrop or 'ground' of quotidian routine. "Almost by definition, the quotidian can be overlooked, not actually noticed for much other than for its sameness and its continuities" (Neal and Murji 2015, p. 812). In the second half of this chapter I want to focus on how, and why, we might rehabilitate these daily experiences and place them centre stage, to make them figure. Habit and routine are central features of our everyday lives, and yet the every day has been largely ignored by the cohort studies.[4] The metaphor of figure and ground can therefore be applied not just to the contrast between the individual case study and the large sample, but also to our temporal focus. In the analyses of the cohort studies it is life events and key transitions that figure against the taken for granted ground of everyday experience.

There are a few examples of the cohort studies trying to collect some of this mundane and everyday information in the past. For example, journalist David Ward reports that the 1946 Birth Cohort Study recorded that he had '*meat (unspecified), peas and potatoes (and blancmange for pud) for dinner on 15 June 1950'* (when he was aged 4) (Ward and Payne-Humphries 2013). Indeed, there have been a few isolated and relatively unsuccessful attempts in the cohort studies to collect and analyse a few days of dietary diaries and activity diaries (Crawley and While 1996). However, the burden that this puts on respondents, and the difficulty of collecting data in a consistent manner, has led the studies to focus on recording more major life events such as house moves, job changes and births, marriages and deaths. Where there is interest in more regular activities such as exercise, and other forms of leisure or social

[4] As Back (2015) has highlighted, Goffman's thought and empirical work is key to an ethnographic tradition in sociology of attention to everyday life. My focus here is therefore more specifically on the quantification of the quotidian.

participation, the cohort studies have typically relied on standard self-report retrospective survey techniques (Sacker and Cable 2006).

There are some parallels here with the distinction made between big, medium and small stories in work on different levels of narrative in the social sciences (Phoenix and Sparkes 2009; Griffin and Phoenix 2016; Back 2015). The big and medium stories are the accounts that individuals give about aspects of the long durée of their lives, often in response to interview elicitation, whereas the small stories are only likely to occur in conversation and correspond to reflections on the everyday and routine aspects of life.

Section 2: Opportunities and Challenges for Longitudinal Research Provided by Self-tracking

The emergence of new technologies for monitoring and recording daily life at an individual level provides both opportunities and threats to well-established longitudinal studies. Wearable devices such as Fitbits, and an increase in techniques and tools for 'self-tracking' or 'personal informatics', now make it more possible to understand, or at least to record, life as it is lived at the quotidian level. Digital self-tracking "has become a mass phenomenon through omnipresent smart phones" (Heyen 2020 p. 124). Self-tracking technologies are marketed as providing insights for the individual user, but they could also be adopted for use in large-scale studies. Digital wearables and associated apps could provide new methods for collecting and recording data that would correspond to some of the small stories of daily life. As will be discussed below, these methods would need to be acceptable to participants to avoid jeopardising continued involvement in longitudinal research. Before exploring the potential use of new technologies for collecting data in the major longitudinal studies, it is worth briefly discussing the growing literature on self-tracking and the 'quantified self'.

Self-tracking and the 'Quantified Self'

The proportion of those using a smartphone in the UK has risen very rapidly from around 17% to 87% between 2008 and 2020. And it is those in the youngest age groups who are most likely to use a smartphone (99% of those aged 16–24) (Statista 2021). Using data collected in 2016 it was estimated that around a third of internet-connected people worldwide track their health and fitness via an online or mobile app or a wearable device (Herder 2016). In 2017 there were reported to be as many as 325,000 health apps (Research2Guidance 2017). Now that technology to facilitate constant monitoring of all sorts of different types of behaviour is so available to individuals—what is the potential for longitudinal research to incorporate this type of information?

The pace of change makes it difficult to know with any accuracy how many people are engaged with some form of purposeful or 'active' self-tracking. There will of course also be a spectrum of engagement. While some individuals may occasionally use a form of self-tracking (e.g. a steps counter), others are much more deeply engaged in projects to observe, analyse and change daily habits and behaviour. One manifestation of this is the 'quantified-self movement', started in California in 2008 by Gary Wolf, which now includes conferences and meet-ups around the world. The quantified-self website has the strap line '*self-knowledge through numbers*', and provides numerous resources designed to help individuals understand themselves better, and make changes to their habits and routines.

A clear theme of the quantified-self movement is that by observing, recording and then analysing their data over time, an individual can gain greater insights, greater control over their life and the ability to improve outcomes. As Heyen (2020) has discussed, using examples from his ethnographic work on self-tracking, "self-related insights are taken into account by the self-tracker in his daily routines … and they contribute, according to his own perception, to his improved well-being" (Heyen 2020, p. 129). Arguably, the individuals who engage in self-tracking are also seeking to distinguish between figure and ground. The process of collecting and recording data using wearables and apps helps to discern

the aspects of daily life which are most salient for influencing an outcome of interest. Frequently, the emphasis is on being able to visualise patterns in the data so that the important figures emerge from the background "noise" of irrelevant measurements (Ruckenstein 2014; Kristensen and Ruckenstein 2018). This individual approach to gaining insights typically does not make use of the same principles of statistical inference used in large-scale longitudinal studies. Here the sample size is a single individual (i.e. an n of one), and the logic is that by collecting multiple data points over time and varying different factors (usually individual behaviour) clear patterns will emerge from the data. However, while both self-tracking practices and longitudinal studies both rely on time, this is framed in very different ways. While self-tracking practices rely on a cyclical and repetitive conception of time in order to observe, record and modify behaviour on a daily basis, longitudinal studies in the social sciences rely much more on a linear conception of time. Time, therefore, figures in rather different ways in these two approaches.

Within the growing body of literature on the practicalities, advantages and experiences of self-tracking, questions have been raised about the type of self that is promoted and constituted by these practices. For some, there is potential for these digital practices to constitute a new kind of surveillance, building in normative expectations about appropriate behaviours, sleep patterns, body size, etc. (Lupton 2012; Ruckenstein 2014). There is also concern that 'self-knowledge through numbers' as supported by the QS community promotes the model of the ideal neoliberal citizen, that is, the self-monitoring and self-optimising individual who voluntarily aims to control and discipline their everyday behaviour (Lupton 2012; Depper and Howe 2017; Sanders 2017).

In a more optimistic vein, Kristensen and Ruckenstein (2018) use longitudinal engagement with a group of Danish self-trackers to explore the concept of the 'laboratory of the self'. They suggest that "Self-trackers use technologies to take the self apart, to highlight certain 'authentic' aspects of it or to intensify human agencies or senses. They try out applications and devices: starting off somewhere, learning about themselves and coming out of the experience in another place" (p. 3635). This leads to the argument that self-trackers are not necessarily dupes skilfully cajoled into digital consumption and constant utilitarian self-improvement. Rather

Kristensen and Ruckenstein provide evidence of reflexive individuals whose engagement with personal informatics makes them more attuned to the emergent properties of the self and enables them to be more conscious of their "agentic aims and powers" (p. 3631).

This explicit examination of the nature of the self that is promoted via self-tracking is echoed in the works of Rapp and Tirassa (2017). Their focus is on how we might try to improve the technologies that enable personal informatics in order to go beyond the rather 'utilitarian self' of the quantified-self movement. Contrary to Kristensen and Ruckenstein, Rapp and Tirassa argue that the self currently implicit here is the self of behaviourist psychology: a self that is ultimately unknowable and therefore under-theorised. This can result in a self that appears to consist only of a set of observable behaviours reduced to data points (Armstrong 2019). This perspective on self-tracking suggests that what actually changes is not the self but the behaviour or indeed the visible (or measureable) body.

By invoking the phenomenological, subjective self as a far more interesting object for study, Rapp and Tirassa prompt an exploration of how personal informatics could be developed to allow individuals to engage much more fully with this subjective, experiencing self. Using the framework of four aspects of the phenomenological self (the past, present, future and interrelated self), they proceed to sketch a research agenda and set of guidelines. Key to their argument is that technologies should be developed in a way that transcends the focus on behaviour change and allows for a more thoroughgoing reflection on the self, one that foregrounds the importance of both context and environment. Their work, therefore, resists the pressure for us to become neoliberal subjects who "are constantly encouraged to change their habits – rather than society and institutions – in order to become happier more productive people" (Chun 2016). It is also noteworthy that their four aspects of the phenomenological self move the focus from the cyclical time of habit and routine and place the individual more clearly in linear time.

Rapp and Tirassa (2017) and Kristensen and Ruckenstein (2018) clearly start from divergent perspectives on the conceptualisations of the self promoted by personal informatics practices. However, both sets of scholars provide us with the promise of re-figuring the self from being

constituted only by behaviour to being fully subjective, reflexive and focused on interaction with the environment. This suggests that personal informatics could have a "grander ambition" and develop "the capability of revealing something of the individual's self" (Rapp and Tirassa 2017 p. 340).

The Potential Use of Self-tracking in Longitudinal Studies (Figure and Ground)

For any long-term longitudinal study, there is likely to be a tension between making maximum use of innovative data collection techniques and maintaining consistency to ensure that the longitudinal design of the studies can be exploited to the full using appropriate statistical analyses.

Arguably, if there were enough resources, then it would be possible both to preserve and to add in new data collection strategies that make use of emerging digital technology. However, those running the studies also need to be cognisant of the burden that data collection places on cohort members. The longitudinal studies have been able to maintain extremely high response rates due to the loyalty of cohort members, who have participated since childhood (Mostafa et al. 2020). There is understandably a fear that introducing new forms of data collection may alienate long-term respondents and compromise the quality of the studies for future researchers.

Part of the problem here is the relative lack of research to date on the ways that individuals routinely use digital devices in their daily lives. There are the beginnings of a body of research on individuals' self-tracking (Nafus 2014; Ruckenstein 2014; Ajana 2020; Heyen 2020; Lupton 2020). However, the more active and engaged individuals who constitute the Quantified-Self movement are still only a tiny percentage of the population.[5] This means that it is difficult to assess the potential for using

[5] In a personal communication via the Quantified-Self forum, Gary Wolf reported in January 2021 that 'We have about 6500 users with accounts. I estimate that we've had between 20,000 - 40,000 individuals interacting in person or online in all our formats over the last decade. (That means posting, registering, or attending in person, not merely viewing a web page.)' https://forum.quantifiedself.com/t/forum-stats/8448/7.

digital recording and tracking methods in a representative sample of British cohort members.

Recently, to address this issue, the directors of the cohort studies commissioned qualitative research to assess the acceptability to cohort members of using innovative methods to collect new types of data (Ipsos 2019). During 2019, interviews were conducted with samples of 28 individuals from each of 4 cohort studies (i.e. a total of 112 interviews), complemented by a focus group discussion from each cohort. Key questions included how cohort members would feel about providing access to their social media activity, their travel (as automatically recorded via travel cards) and their financial transactions (using a specially designed app). Interviews and focus groups also covered the more general use of new technologies such as apps to actively or passively collect detailed data including screen time, GPS and activity tracking.

Despite the strong loyalty of cohort members to the longitudinal studies, it was striking that across the interviews and focus groups, study members *consistently* reported that novel data collection felt like a form of surveillance and therefore regarded it with unease. Some of the comments included:

> *The more that the study moves towards big brother tracking, I would struggle with it and may withdraw from the study. (BCS70, telephone interview, 83, did not take part at age 46) (p. 87 Ipsos Mori, 2019)*
>
> *I wouldn't like to do any of it it's too personal, too private that feels like big brother is watching me. (BCS70, telephone interview, 103, took part at age 46) (p. 85, Ipsos Mori 2019)*
>
> *No, I wouldn't agree to any of that… I know they always say: 'big brother knows where you are' and I'm sure somebody does but I don't want to have all these apps and things to make it even more. I'm not interested in any of that, no. (NCDS, telephone interview, 10, took part at age 55) (p. 85, Ipsos Mori 2019)*

There was a more positive reaction to the idea of collecting exercise data using a Fitbit, or similar wearable device, as this was seen by cohort members to be directly linked to health research and therefore an acceptable part of the study.

> *I feel that is a difference as it can show the study how many steps I have taken and how many calories I have burned then yes as it was just health focus which is important rather than how long I have spent checking the weather on my phone. (BCS70, telephone interview, 103, took part at age 46) (p. 86, Ipsos Mori 2019)*

It is interesting that in the first three of these quotations the cohort members each invoke the fictional 'Big Brother', originally conceptualised within Orwell's dystopian novel *1984* (and then popularised by the reality TV series). This is a ready shorthand for surveillance that covers the most private and seemingly inconsequential activities of life. Here then we see a contrast between individuals being uncomfortable with tracking of everyday habits and experiences that seem to have no readily understandable benefit for research, while there is an acceptance that monitoring the body—calories input and expended—can have a value for understanding and improving health.

There are aspects of the major longitudinal studies that now capitalise on the use of the web and personal computers to simplify data collection (e.g. the age 62 sweep of the 1958 cohort is collecting a dietary diary using the web). However, no extensive use is being made as yet of wearable devices or the ability of smartphones to prompt the user to report on activities over the course of a day. This means that consistency is maintained. However, what remains missing from the detailed quantitative linear chronicles of longitudinal studies is a feel for the daily lives and everyday practices of cohort members—how much time they spend commuting, working, watching television, out with friends or asleep; how many steps they take; how their heart rate varies over the course of a day, whether they eat three meals or multiple snacks; etc. This description of what is missing is not to diminish the value of the rich data of the cohort studies but rather to serve as a reminder that they provide only a partial picture of individuals' lives. They foreground linear time, and it is this which figures against assumed, but invisible, daily experiences. As Back has argued, "the everyday matters because it offers the ability to link the smallest story to the largest social transformation" (Back 2015 p. 834)

In an article for the *NY Times* magazine, Gary Wolf, a co-founder of the Quantified-Self movement, wrote that:

> We track ourselves all the time, but something changes when we digitize this self-monitoring … when the familiar pen-and-paper methods of self-analysis are enhanced by sensors that monitor our behaviour automatically, the process of self-tracking becomes both more alluring and more meaningful. Automated sensors do more than give us facts; they also remind us that our ordinary behaviour contains obscure quantitative signals that can be used to inform our behaviour, once we learn to read them. (Wolf 2010)

This desire to adopt methods which allow patterns to surface from the background noise of data and to figure out what is meaningful, once again returns us to the metaphor of figure and ground. We want to believe that there is more to life than random noise and that meaningful patterns will emerge if we only have the tools and patience to be able to observe what is really there.

There are also some interesting parallels here between the promise or 'allure' for individuals that once we fully understand ourselves we will be able to improve our lives and our well-being, and the promise of the cohort studies whose overriding aim has always been to provide policy insights that will improve the lives in the aggregate, especially for disadvantaged groups within society. As Ferri et al. wrote in conclusion to their 2003 book on the cohort studies:

> To gain a proper understanding of what (policies are) likely to be most effective, when and with whom, we need much more research on the mechanisms and processes of success and failure in an increasingly complex changing world. Investigation of the interactions of the effects of social change with the development of individual lives will continue to drive research using the cohort study data in the years to come. (Ferri et al. 2003: p. 312)

Whereas the power of the cohort studies lies in the large sample size as well as the length of observation, for individuals using digital methods to track and record their behaviour the sample size is an n of one. Both approaches hope to be able to discern meaningful 'patterns' from among the background noise of a superfluity of data points. Both, therefore, use methods of analysis that will enable the figure to be distinguished from the ground. What is also shared here is the possibility of collecting data

over time and observing how change in one domain impacts on outcomes in another. However, as discussed above, there is a sense in which the conception of time is subtly different in the two approaches. In large-scale longitudinal studies, the emphasis is on linear time with cyclical time assumed, but relatively obscured in the background. In contrast, the process of self-tracking has tended to interrogate habits embedded in cyclical time, "practices acquired through time that are seemingly forgotten as they move from the voluntary to the involuntary, the conscious to the automatic" (Chun 2016, p. 6).

Conclusions

This chapter has explored the ways in which individuals can be made to appear, or disappear, in longitudinal research, whether that is in large-scale cohort studies or in recent work on personal informatics. Invoking the metaphor of figure and ground raises the question of what counts as the 'ground' that is, what is the backdrop or context against which the subjects of research (i.e. the figures) can be made to appear or disappear, and to what extent does that context actually serve to constitute the figure itself. When focusing on large-scale, quantitative and structured cohort studies, the backdrop or ground can be understood to be both the large representative sample that frames and makes sense of each individual's set of unique data points, and the historical and geographic context. Indeed this methodological approach to understanding individual lives is already well-rehearsed within the literature on the Life Course (Giele and Elder 1998). And this literature draws attention to the way in which historical events, such as the Great Depression, not only provide a backdrop to a life but actively constitute the experience and subjectivities of each individual.

What is key in large-scale quantitative research is that, paradoxically, in order to focus on understanding the factors that may influence *individual* outcomes the individual research subjects are effectively removed from sight. Although each individual contributes myriad data points, their data is deliberately anonymised. It is the researcher and not the research subject who crafts causal narratives. Using multivariate, and sometimes

multilevel, statistical modelling techniques, variables and coefficients appear to have agency, that is, these are the figures of interest here. Even innovative case-study approaches that have sought to refocus attention on individuals rarely seek ultimately to foreground the individual but rather to develop deeper understandings of causal process or historical context and change.

The second half of this chapter shifted attention to the implications for longitudinal research of the increase in self-tracking practices and personal informatics. While these activities, with an n of 1, appear to put the individual centre stage it is still instructive to consider what constitutes figure and ground in this novel approach to 'personal science' (Heyen 2020). For an individual self-tracker looking for patterns in their data over time, the ground is perhaps those aspects of individual experience and behaviour found *not* to be relevant for achieving the outcome of interest; whether this is improved fitness, attention, sleep patterns, or wellbeing. The practice of self-tracking is motivated by a belief that with the right tools and techniques it will be possible to discern the meaningful patterns in the data, to figure out what matters and to adjust behaviour accordingly.

What the burgeoning literature on personal informatics often neglects however is a deeper or more explicit theory of what constitutes the self (Rapp and Tirassa 2017; Kristensen and Ruckenstein 2018). Arguably if the data points, collected by and on an individual, are no more than representations of behaviour, then the self becomes no more than the coordinator of that behaviour. Such a self would arguably be completely uninteresting and one dimensional if it were not for two narrative elements, the ability to infer causal links from the quotidian data observed, recorded and visualised in cyclical time, but also the possibility for change over linear time. In this context, narrative serves to vivify data points and constitute a self that is traceable over time *and* can change over time in a way that can be meaningfully understood. In seeking to figure out the individual in longitudinal research, we therefore need to attend to more than the contrast between (or mutual constitution of) figure and ground, but their mutual constitution in cyclical and linear time. Perhaps the greatest challenge for the future is how to make best use of new

technologies for data collection while also considering how to place a thoroughgoing subjective, or phenomenological, self at the centre of our research narratives.

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10

Figuring Out Exposure: Exploring Computational Environments and Personalisation in Interdisciplinary Air Pollution Research

Emma Garnett and Srishti Bhatnagar

Introduction

The epidemic of asthma and other non-communicable diseases triggered by air pollution has finally placed the environment firmly under the purview of global public health (WHO 2018). Clare Herrick (2020) argues this is an opportunity to shift the optics of health away from behavioural patterns of consumption and towards the complex causalities of toxic exposure. Yet, seductive ideas of technical fixes, awareness-raising and reified models of behaviour change continue to persist in policy and public debates. This is a conceptual and methodological challenge that requires finding new ways of rendering sensible the variegated, interconnected

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and inequitable geographies of environmental exposures and harm (Fortun 2012; Sultana 2021). Rather than producing more data, calls for 'smarter' sensing focus pollution monitoring in places of concern, hotspots and in relation to everyday practices like walking or cooking (Reis et al. 2015), often through participatory and experimental approaches (Lezaun et al. 2017). In this chapter, we discuss an interdisciplinary project that is taking up this task by combining computational methods and embodied data to simultaneously map, know and respond to air pollution. In the project, air pollution is figured through a composition of data practices that include the generation of exposure data by people with asthma. We use the concept and method of figure to explore the tensions that emerge when individuals are both objects and subjects of research. By involving the experience of people affected by air pollution, the project engages with a key concern in public health research and practice of how to best identify exposure risks and generate knowledge that can effectively inform action.

The effects of processes of computation and data science on daily life are being critically engaged with by researchers working in and across the domains of health and medicine (e.g., Day et al. 2017; Prainsack 2017; Radhakrishnan 2021; Ruckenstein et al. 2017), government and welfare services (e.g., Eubanks 2018: Khera 2019), cities and urban planning (e.g., Duarte and Priyanka deSouza 2020; Mattern 2017; Tironi and Sánchez Criado 2015), among many others. Sensing technologies in particular have been described as "a new extension of social control" and "a site where alternative modalities of power are being forged" (Nafus 2016: xiii). In their ethnographic work of a national programme for smart homes in Chile, Tironi and Valderrama (2021) detail the various explanatory logics of domestic sensors provided by government officials, technicians and the residents invited to monitor and quantify their energy use as part of a national programme. According to the authors, a central aim of the initiative is to improve the environmental performance of homes by no longer relying on what people say they do, but on what they actually do: participatory and live information is produced through continuous and recursive feedback from sensors installed in people's homes (2021: 194). In this example of "sensing governmentality" (Tironi and Valderrama 2021), *personalisation* is not understood "in the sense of users shaping technologies within their own practice but as technologies that

recognise their users and shape themselves accordingly" (Suchman 2012: 222). It is this 'intelligent' or 'aware' feature of sensing that concerns us in this chapter because it invites new interdisciplinary ways of doing environmental health research. To engage with these developments, we draw on social science and humanities studies of digital technologies that aim to extend the human body's 'innate' capacities through informational means (Creager 2018; Viseu 2003; Viseu and Suchman 2010). We are going to focus specifically on the use of wearable technologies in the interdisciplinary field of air quality and exposure science, a research practice and approach that is increasingly common. By encouraging personal exposure monitoring, new and different relations between people and air are made available for computational calculation.

This chapter is based on ethnographic research of a UK-India funded research project using wearable sensing technologies to generate individualised data on air pollution in New Delhi, India (2018–2020).[1] We were both researchers on this project, Emma Garnett from the UK and Srishti Bhatnagar from India, and involved in some aspects of the fieldwork led by a multi-sited, interdisciplinary team of senior co-investigators in computer science, public health, digital design and sociology (based in a variety of institutional locations across the UK and India).[2] For Emma Garnett, the collaboration formed a component of a separate postdoctoral project examining air pollution sensing technologies in biomedical and public health research.[3] The project in Delhi is an interesting interdisciplinary case study because of its inclusion of social science research as a central work package, which is rather novel in air quality and exposure science. As an international research project, it also represents an aspiration in science, and often research led by the Global North, to expand data coverage of air pollution by monitoring 'hyper-local' or 'micro-environments' in cities in the Global South, and so encapsulates the geopolitical relations and historical legacies of public health, science, and biomedicine.

In the sensing project we discuss here, the project team also sought to include the experiences of people who bear the brunt of the health costs

[1] Funded by a Global Challenges Research Fund grant.

[2] These institutional locations will remain anonymous in this chapter.

[3] Funded by an ESRC New Investigator Award: ES/R008612/1. The study sought ethical approval from King's College London Ethics Ref: LRS-18/19-10426

of air pollution and/or who might not be in a position to necessarily "*claim* clean air" (Negi and Srigyan 2021: 63, emphasis included): children with asthma. We conceptualise 'the child with asthma' as a key figure in contemporary air quality science and public health. It is a figure that brings together a concern to improve public health interventions through more granular measurements of air pollution exposure and its effects on the body by focussing on the people and communities who bear the greatest health burden. As a method, we use the figure of 'the child with asthma' to explore the tensions that emerge when involving people understood to be impacted by air pollution as both objects (sensing bodies that measure air pollution) and subjects (knowing bodies that experience and respond to environmental exposures) of research.

'Person-Centred Environments'

The concept of 'person-centred environments' (PCEs) was coined and presented by computer scientists as a novel methodology that incorporates clinical knowledge, big data practices and analytics to track and quantify the embodied effects of air pollution. It can be understood as a practice of personalisation, in which the individual person is the object of study: the person wearing the sensor produces a radius of data points that quantifies exposure 'inside the body' through the linking of air pollution measurements, environmental variables, breathing rate and other vital responses. They are also subjects of research because self-produced geo-time stamped data and the self-reporting of daily trajectories are also considered important for understanding exposure. People participating in this study help provide information about social, environmental and genetic contexts from which multiple data points can be generated about air pollution's health effects (e.g., a measure of air pollution and a quantified bodily response). Our ethnographic research studied this methodological approach in action and analysed how it influences the way in which the problem of air pollution is known and understood.

Recent evidence shows there is no safe level of exposure to many pollutants (Kelly and Fussel 2015). This challenge has ethical implications because if the spatial demarcations between healthy and unhealthy air are

unclear, then efforts to improve health in an equitable manner are constrained. The practice of personalisation in scientific research is a response to this challenge because it enables new lines of difference to be stratified along social and biological lines. In our case of PCEs, new groupings of people in relation to air pollution are based on molecular profiles of disease and knowledge of the biological relationship between air pollution and asthma. If the 'sensitivity' of children with asthma to air pollution is known, then how they respond to different environmental settings and circumstances is turned into something to be further studied and quantified. In terms of public health efforts to improve health, personalisation articulates and locates exposure and risk in ways that have consequences on how the actions and responsibility to improve it are framed. Asthma and the anticipated differences in the air that it reveals in human bodies is one way in which new normativities and mechanisms of public health are being sought. As Lury and Day (2019) argue, personalisation is always a process of generalisation because entities (such as cancer, but also, as in this case, air pollution's effects) are specified through the sorting and arranging (drawing lines of inclusion and exclusion) of classes of persons (e.g., people with asthma and children).

The body of research on asthma is huge. It remains a major research topic because it is among the most prevalent non-communicable diseases in childhood, and early life exposures to air pollution play a role in determining the disease in later life (The Global Asthma Report 2018). In our research, we found that focusing on the living environments of people with asthma was used as a way of starting to explain uncertainties in knowledge and the complex and non-linear causalities of air pollution and health (Fortun et al. 2014; Kenner 2018). The conceptual starting point of PCEs is that bodies are permeable, particularly those with asthma, and that living in polluted environments, like areas of urban Delhi, produces measurable perturbations on individuals' internal physiologies. The hypothesis that follows is that these perturbations are also likely to be modified by other contextual factors, such as the built environment or variables related to socio-economic status. This way of accounting for the environment envisions a neat and all-encompassing way of translating incommensurable phenomena into actionable knowledge. Identifying these kinds of explanatory logics provides a lens from

which the politics of environmental health shaping the interdisciplinary intersections of a 'global' air quality science and computational public health can be investigated (Landecker 2011).

Linking bodies to environments in this way turns 'vulnerable bodies' into objects of knowledge through which significant influences of 'bad' environments can be measured in relation to a normative 'good' (Choksey 2021). In the case of this project, analytical algorithms are being developed to extract relations of interest from the material contexts of exposure (Amoore and Piotukh 2015). However, by trying to establish more precise measurements of air pollution, computational methods also establish which individual, environmental, biological and social pathways are relevant (Lury and Day 2019: 19). The process of figuring out exposure in this way relies on setting aside some aspects of a person's surroundings. As we will go on to show, the figure of the child with asthma was put to work in order to distinguish the environmental relations that matter for public health universally. In doing so, we show how personalisation and the 'optimisation' it promises can serve to limit the possibilities of situated actions and solutions. Advice to reduce pollution and exposure remains central to public health efforts, and more accurate data is often imagined as a tool to aid everyday decision-making. Yet the options available for people to avoid exposure or clean their breathing spaces are not equally shared in and across societies. We found that this conundrum is also embodied in the figure of 'the child with asthma,' which we use as a method and concept for unpacking how PCEs configure sociality and health.

Having introduced PCEs, in what follows we provide a brief overview of the wearable sensors involved in the study and how they work. We then describe the project's interdisciplinary methods and the ways in which they provided a research context for our own ethnographic study of embodied data practices of personalisation. Following this, we detail two occasions in the early stages of the data collection in Delhi in 2019. Through the figure of 'the child with asthma,' we explore the tensions between participants as objects and subjects of research and how this relates to the methods of interdisciplinary research.

‘Experimental Entanglements’: The Wearable Sensors Study

The concept of PCE is integral to the interdisciplinary design of the project in Delhi, which was led by computer scientists in the UK. The wearable sensors used were developed in the UK and deployed in India to explore their potential as an alternative method of monitoring air pollution for public health. The intended participants were children medically recognised to be living with asthma. The protocol for using wearable sensors was adapted from another project led by one of the teams in the UK and which, until COVID-19, continued to be used and modified for related air pollution studies globally. This kind of flexibility in the conduct of monitoring projects is characteristic of global air pollution experiments, in which sensing and monitoring infrastructures are imagined as replicable in different places. It is an approach that reinforces a model of research shaped by a colonial legacy of technoscientific solutions being led by institutions in the Global North and applied to Global South settings. This is particularly significant to note given there are numerous air quality projects in Delhi that are led by Indian scholars and institutions (including projects involving our colleagues based in India and the UK) and are also exploring alternative systems of sensing, monitoring and managing the air (Gani et al. 2022). Indeed, sensors have helped facilitate new and innovative formats for doing science, open data formats and participation in cities globally, and are therefore objects that highlight (and challenge) the power relations and systems of privilege that structure the flow of knowledge, people and resources in a global air quality science (Negi and Srigyan 2021). Indeed, Emma Garnett was the only core team member who had not conducted research in India before but took on a significant project role.

Our main focus in this paper is on the practical work of generating data, because it allows us to better understand the end goal of research and how this might differ in an interdisciplinary research team. The wearable sensor technologies designed by computer scientists record personal exposure to outdoor and indoor air pollution. It was a clinical study design. Each participant in the study was provided with a set of air

quality monitors that measure PM2.5, a heterogeneous pollutant made up of microscopic solid or liquid airborne matter. It is also a pollutant that is commonly used in air quality and exposure science as a proxy measure for human health risk. The wearable sensors consist of a GPS-enabled wearable sensor designed to record physiological changes (for instance, the participant's breathing rate) and track movements. As well as mapping data at a more granular scale than is common in studies of air pollution, like other lower-cost sensing studies, the aim was to also pick up local sources of pollution and aspects of urban environments that mediate exposure (e.g., Hagan et al. 2019). The devices were packed in small sling-bags to carry the power adapter and phone that provide access to an app interface sharing the sensor readings. The breathing sensors were worn directly on the body. A clinical protocol using the molecular profiles of asthma was adapted to monitor the influence of exposures on children with asthma who are known to be susceptible to air pollution's toxic effects (see, e.g., Vardoulakis and Osborne 2018). Participants were instructed to wear these sensors for a 48-hour period and to continue with their normal daily routines.

In addition to the sensor data and qualitative interviews, the project's data collection strategy included a survey covering demographic details of each individual (age, educational status, class, caste, religion), the composition of family and household, medical history and asthma management. Other sets of questions sought to capture relevant features of the locality of the participant, such as fuel use and housing quality (e.g., ventilation). A participatory workshop led by digital designers formed the final project work package and was explicitly tasked with translating the qualitative and quantitative data of exposure into impactful knowledge and outcomes. The aim of the workshop was to develop personal stories about air pollution with the same participants who wore the sensors and to then develop these into a series of public-facing animated memes. Although air pollution is routinely figured through numbers, other ways of linking these figures and quantified accounts of air pollution through artistic and creative methods are increasingly recognised as important by researchers and policy makers. The interdisciplinary design of this project was therefore arranged in such a way that alternative, personal narratives of air pollution might be told.

We will now examine and unpick two moments of friction in the interdisciplinary team that relate to the air pollution sensing data practices. These tensions emerged in part because of the reflexive social science involvement in the study. However, they were also practical problems that are generative to think with because they articulate the specific occlusions of personalising air pollution—particularly in relation to understanding systems of marginalisation. The research in this chapter is based on ethnography of the research process, including our involvement in fortnightly team meetings, the conduct of interviews (by Srishti Bhatnagar) and facilitation of a workshop. By tracing how the interdisciplinary methods unfolded and played out in practice, we show that the combination of methods in the project generated very different kinds of data about air pollution that led to epistemological and ontological frictions which support reflexivity (Garnett 2017). Through a discussion of the experimental entanglements (Fitzgerald and Callard 2015) animated in PCEs, we delineate some of the fraught intentions and ambitions the figure of 'the child with asthma' produced (cf. Murphy 2017: 82).

Configuring Environmental Health 'Pathways'

The design and implementation of wearable sensors that materialise a PCE and personalised model of exposure require two key features: (i) the participation of patients with asthma willing to measure their exposure as part of the research study and (ii) developing interpretive frameworks from which to determine significant environmental influences and thereby predictors of health. At the time of writing this chapter, the computer scientists on the project are sorting through the large amounts of data generated by the study to identify significant patterns and relationships. Here, however, we focus on the practical work involved in configuring a computational research environment from which data practices of personalisation in air pollution research could be conducted. We highlight how personalisation in PCEs relies on the embodied practices of sensing, in which wearing the sensors continually enfolds possible environmental (contextual) influences through real-time measurements. It was anticipated by the various researchers who contributed to the design

of the research of PCEs (this research design is part of a longer-term vision and approach) that the monitored body contains measurable responses to air pollution. This starting point is based on evidence of the genetic and environmental factors that modulate susceptibility and response to air pollution. We draw on Lury and Day's (2019) notion of "pathways" to account for how the increased sensitivity of people with asthma presumed an individualised response is measurable. By measuring exposure inside and outside the body, these already well-evidenced exposure pathways served as a background from which individualised health effects of air pollution could be studied in relation to public health. Put another way, the specific gene-environment pathways were not the object of study, rather they facilitated claims to personalisation because the individualised data could simultaneously refer to a generic classification, in this case of vulnerable groups or 'at risk' groups.

Negotiating Participation in Research

A core feature of the project was the recruitment of children with asthma to participate in monitoring their exposure. We were variously involved in project discussions of the recruitment process, working closely with colleagues in public health, liaising with doctors and health professionals providing care for asthma out-patients and speaking to parents and children about their involvement in the research. Early on in the recruitment process, several senior investigators in the team expressed concern that the individuals and communities most likely to suffer high levels of air pollution and associated health burdens could be missed because of the study's protocol. It was argued that there are many young people who have asthma or asthma symptoms but are living without an asthma diagnosis. The implication was that by only recruiting via government and private hospital out-patient lists the project would likely fail to record a range of social and health experiences of air pollution. Following this discussion, one of the co-investigators contacted an environmental NGO working closely with people living in areas of Delhi that experience high levels of air pollution because of well-known emission sites nearby. The aim of making initial contact was to explore the possibility of the project potentially extending the recruitment process beyond formal medical

centres in order to cover a range of urban areas. The NGO agreed to help and a couple of weeks later the research team working in Delhi (including the authors) was introduced to around 60 children attending an after-school club. During this meeting, the sociologists and public health researchers encouraged introductions, provided an overview of the project and initiated a lively conversation about air pollution and its health impacts.

Unsurprisingly to some of the team, no one claimed to be experiencing breathing difficulties and only a few reported occasional symptoms of asthma-like conditions. But this finding troubled others in the team. The field note extract below recounts discussions in the weekly project meeting following the visit, in which some of the difficulties involved in 'finding people with asthma' outside of biomedical health settings were identified:

> The team discusses the previous week's field visit to an after-school club in North Delhi run by [the NGO] and acknowledges how supportive they have been to the project. Those in the meeting who joined the visit assured the rest of the team that the children who attended the discussion were from a 'low-income group' with limited access to medical care [a criterion previously agreed for the three different socio-economic classifications prescribed by the project protocol]. The 'happy news' is that very few children attending the after-school club reported experiencing breathing difficulties. Despite living in an area often considered as suffering high air pollution (near waste sites with open burning, close to construction sites and vehicle pollution) the surrounding environmental conditions did not correlate with the children's accounts of their own health. (Fieldnotes 19 February 2019)

The meeting discussion threw up two rudimentary findings that were hard to reconcile with the project's protocol. First, air pollution and asthma are experienced as different phenomena with different social meanings and cultural associations. Second, the causes and experiences of health were not the same as biomedical interpretations of risk and harm in global health (Das 2015). The figure of 'the child with asthma' brought into focus an interdisciplinary tension concerning the best way to bring

the problem of air pollution in relation to the problem of asthma so as not to occlude social marginalisation.

For the computer scientists, 'the child with asthma' was primarily a context from which air pollution could be studied anew. Participation was exclusionary, involving only people with asthma because diagnosis is a requirement for identifying 'a personal pathway': the strong evidence base of air pollution's impacts on asthma meant 'relations' were understood to be largely imperceptible but 'out there' and therefore ready to be measured. For them, the relations opened up the possibility for air pollution to be understood in 'novel' ways. The identification of children with asthma was thus a necessary part of the project. In a conversation with one of the computer scientists, we were told that the breathing sensors do not have the sensitivity to pick up physiological responses to air pollution in a person without asthma. A person could only be figured as an object of research in PCEs through their capacity to reveal influences and contain potential correlations. In order to make air pollution perceptible in the big data sets of computational air quality science the person has to be 'cut out' (cf Amoore and Piotukh 2015) or provisionally produced. That is, personalising air pollution relies on the overdetermination of asthma which is then able to assume a causal relationship rather than a 'merely' contextual one (Sunder Rajan 2012: 6). This determination helps the computer scientists manage the sheer amount and complexity of environmental exposures, yet it also sets the stage within which only some forms of health and sociality can take shape.

As was recognised by the project team, identifying the environmental factors that trigger asthma or exacerbate symptoms by relying exclusively on biomedical categorisation resulted in overlooking some of the so-called upstream determinants of health. By upstream determinants we are pointing to what Nancy Krieger calls "the causes of causes," in which the conjoining of "power over" and "power to do" structures people's exposure to material and environmental health hazards (2008: 223). Setting criteria and exclusions is part of knowledge-making, but it is nonetheless significant that in this situation the criteria of asthma created a contradiction because it excluded the possibility of including the experiences of those often excluded from discussions about what to do about air pollution (children, marginalised social groups). Friction in the

interdisciplinary team meant that the status of asthma as a biomedical category (a ground or context) for figuring out air pollution's effects was contested, and the uneven geographies and unequal impacts of exposure difficult to approach as a problem of social justice *and* public health in the research.

(Personal) Data Frictions

In a second example of friction, in a rather tense team meeting during the first data campaign in summer 2019, the descriptions "add[itional]" and, later, "complement[ary]" were used by one of the senior scientific investigators to describe the role of the social research data in the project. In this framing, the narratives generated by the interviews were understood as providing supplementary variables of use only for interpreting or validating the quantitative sensor data. This description of the potential value of the data was refuted by several of the team involved in the qualitative research. It was argued that the narrative histories of asthma, practices of care and "the intimate knowledges of air through their bodies and their bodies through air" (Negi 2020: 20) generated in the interviews should also count as knowledge and evidence about air pollution.

This difference in valuation was in part structured by a temporal out of jointness (Fitzgerald and Callard 2015) between the "in real time" data of PCEs and the non-linear temporalities that characterised the qualitative assessments of living with asthma. In the quantitative data, the person is fixed in space and time, and the person only comes into view through analytical processes where the co-occurrence of particular data elements gives rise to them (Amoore and Piotukh 2015: 354). However, these data cannot necessarily account for other temporalities such as, for example, cycles of stress (although this is a known trigger for asthma) nor contingencies in everyday forms of decision-making. Tensions concerning the meaning of data are the result of disciplinary and epistemic hierarchies. They also resonate with what has been written about the practical challenges of developing explanatory and interpretive frameworks for making sense of environmental data in the fields of postgenomic science and informatics (Richardson and Hallam 2015; Prainsack 2017). By

reducing the environment to a series of compartmentalised variables, the 'sensing body' (in our case study) supports a puzzle-solving process in which social and material relations of exposure are assembled into something comprehensible. This is aided by gene-environment links to established biological mechanisms of asthma, which seems to be setting the parameters for exploring new ways of thinking, working and explaining air pollution (cf Richardson and Hallam 2015: 234).

Ethnographic insights from other research emphasise the importance of the patient's work of participation in scientific efforts to fill "data gaps" (Prainsack 2017: 24). In our case, the ways in which sensors were worn and mobilised, or not, also frequently undermined assumptions about the person as a unit of analysis in PCEs. Together these differences concerning data raised questions about who benefits from an expansive and "inclusive" approach to air pollution monitoring? When discussing their experiences of wearing the sensors and participating in the research, participants very often reported not wearing the devices as self-tracking devices. Many children told us they were wary of taking the sensor outside in case it was misplaced or broken. The parents of others explained that they were concerned about what some people might say about their child if they wore the sensors outside the home. These issues either came as a surprise for some of the computer scientists in the team or were framed as something that needed to be overcome. These interactions with the sensor are also a way to understand the differentiated experience of air pollution and disease, as we will continue to explore.

Efforts to evoke an 'in real time' response were hindered because it was not always possible, for those participants who were interested, to read the aggregated data on the app interface (although final reports were provided for each family by the team). Yet it was precisely this data, generated through sensing in everyday practices, like socialising outdoors or playing with friends in neighbouring areas, that the computer scientists wanted to understand to specify individual exposure pathways and, indeed, the kinds of data we thought might be interesting to explore with our social science colleagues further. In these moments the interviews were practically if not epistemologically valuable to the computer scientists because they aided the preliminary screening and interpretation of sensor data. For instance, the interviews and fieldwork helped to provide

an explanation for static rather than mobile data collection, why there were long disruptions in data collection (as when families faced connection issues) or why there were sometimes two data sets for one individual (when a participant wanted to try the sensor out again). Although these errors could be managed through statistical technique, they also provide a juncture for attending to the interpretive processes of data practices of personalisation.

Indeed, the challenges of generating personal data are illustrative of the ways in which persons in PCEs always also stand in relation to other personal and nonpersonal environments of exposure (Lamoreaux 2016). These tensions encourage a shift in analytical focus, away from what makes environments 'bad' to how they are made 'good' by participants themselves. The interview transcripts collated a number of creative ways young people dealt with events that aggravated their asthma: not running around by playing batsman rather than a field position in games of cricket; working extra hard to overcome missing days from school; by trying and testing medicines to see what works in different situations; and tracking causes of symptoms and what improves them. As demonstrated in the reference to the team meeting discussing the role of qualitative data, the PCEs gestured towards other possible experimental entanglements where the object of research and its aims could be questioned by its subjects.

To further explore this point of unsettling the relations of subjects and objects we also want to consider a children's workshop that was hosted by one of the collaborating institutions in North Delhi on a Saturday in early May 2019. It was originally intended as a knowledge translation activity, however, due to various logistical challenges, the workshop ended up taking place as the first data campaign was just getting started and therefore intervened in the conduct of the research rather than simply facilitating dissemination. It brought together the research team, parents and children, including the children who we met at the after-school club. The clinical protocol was put to one side and therefore who could participate was not predetermined beyond their being a child or young person.

The workshop sought to visualise personal, embodied narratives by exploring experiences of air pollution collectively, as this description of the process explains:

> I mean that's how it was also planned [to use different artistic mediums to develop the narratives] but giving it flexibility, that is also how it worked, that you start first with just playing with the idea of pollution. How can we experience it? What are the words to be able to experience it? Then what are the colours to be able to experience it? And then we moved to this idea of, like, a character who is experiencing pollution; then that character's setting, which is kind of taken from their experience of their environment, and then it comes to be personal, drawing from personal experience. (Group Interview, 11 May 2019)

The mixed media approach proposed provides a different form of participation in which the purpose is to encourage descriptions and depictions of it and to go beyond, as one facilitator put it, 'generic accounts' of the problem. By characterising a person with asthma which is relatable to the participants, and potentially wider publics, the 'person with asthma' becomes a subjective storytelling device in which the objects of air pollution, asthma, and inequality are held together without one displacing the other. This not only affected the objects of research but the power dynamics assumed in the clinical research because participants were not there to understand their own risks but rather to consider what actions people and communities can take to ensure more breathable air for children with asthma. In one instance, some of the children shared a specific verb to describe a feeling that breathing in pollution can create, like a trapped cough or having something stuck in your throat. The word was not known to any of the adults in the room, and it shifted the tone and dynamic of the dialogue because the children participating momentarily became the experts in how to describe and account for air pollution's effects.

Following the workshop the visualisation created by the children was further developed in dialogue with the interview transcripts to create a series of animated memes (to be shared publicly) that linked the problems people face to calls for collective action (with the tagline "let me breathe"). PCEs were temporarily denaturalised, and the question of the future shown to be neither inevitable nor obvious; interventions by children with asthma as subjects of the research, not only as objects, were introduced. In working in the disconnections between the individual accounts of air pollution produced in the interviews and sensor data collection, how the figure of 'the child with asthma' would lead to the public

health promises that underpinned its emergence was destabilised. This is not a gap in the data but a destabilisation which reveals the dynamics of inclusion and exclusion that characterise personalisation and which predetermine the parameters for knowing air pollution exposure.

Conclusions

Global inequalities in air pollution and uncertainties in health evidence have led to new methods, technologies and collaborations for studying the variegated environmental contexts of exposure in different places. Drawing on our participation in a computer science-public health-social science collaboration measuring embodied air pollution exposure in Delhi, we use the figure of "the child with asthma" as a concept and method for studying the interdisciplinary methods involved in making environments personal. The computational framework of PCEs meant research participants were approached as both research objects and subjects: measuring air pollution inside bodies stabilised the relationship between air pollution and health as an object, whilst the person wearing the sensor mediated air pollution through situated negotiations and engagement with it as a subject. However, this dynamic relationship caused tensions between the project's team members during the setting up of the research process and when trying to determine the role and value of people's involvement and the different data sets they produce. First, we showed how clinical representations of asthma result in personalised monitoring that influence which 'environments' are included in research. By invoking and requiring an asthma diagnosis, the places and contexts of exposure to pollution that the research also sought to get a handle on were excluded. Second, we showed how the different methods continually reconfigure the subjects and objects of research in ways that destabilise what the problem is (asthma or air pollution, public health or inequality) and how to approach it analytically (instrumentalising qualitative data or engaging with it in a critical manner as at the workshop). By tracing a series of subject-object relations we argue that practices of figuring air pollution as personal in interdisciplinary research create new biomedical categories—vulnerable or 'at risk' groups. However, the environmental and social "pathways" embodied

sensing also materialise is limited by an associated narrow definition of exposure, despite the possibilities for its empirical expansion.

We therefore use the figure of 'the child with asthma' to investigate the possibilities and implications of computational methods (sensors, algorithms) for understanding the dynamic relations between embodiment (e.g., the figure) and context or practice (e.g., ground or background) in air pollution exposure. By figuring out exposure in this way it is anticipated that public health interventions can be specified and improved. We found the interdisciplinary tensions that emerged in the project generative to think with because of the ways personalisation indicates the possibility or necessity of action beyond the generation of scientific knowledge and data (Rajan 2006: 179)—although the sensors were ultimately only a tool of foresight, a way to manage probable futures (the environmental conditions that increase the likelihood of worsening asthma symptoms) rather than target the causes of exposure and delineate actions. Nonetheless, the introduction of personal air pollution monitoring is promising to capture societal and geographic differences in exposure that could make perceptible new causal pathways that are not only biological in nature. In our case, it is hoped by some of the computer scientists involved that even if not calculable individual knowledge and experiences can ultimately enlarge computational analysis. What stymies these efforts are pre-determined ideas of symptoms and disease that are stable across environmental and cultural contexts (even if their physical and experiential manifestation are recognised as situated). The figure of 'the child with asthma' has helped us elaborate some of these operations of inclusion/exclusion in data and algorithmic practices, that at once expand and contract ways of accounting for the embodied effects of air pollution and harm.

Supporting a more granular and targeted approach to data generation does not necessarily challenge the socio-political conditions and inequalities that allow environmental hazards to happen in the first place (Senier et al. 2017). As Michelle Murphy argues, granular studies of embodied health (e.g., air pollution personalisation) need to be interlinked with contestations over the physical production and distribution of chemical harm (2013: 698), including how prevalent public health and global health approaches might obfuscate these dynamics. Although the dynamic

subject-object refiguring of embodied air pollution sensing in our case study did attempt such interlinking to address these complexities, the challenges involved in making commensurate the various roles and possibilities of personal data means how it actually influences approaches to exposure and risk is difficult to discern. The interdisciplinary methods that PCEs facilitate did help to disrupt the dominant idea that personal data or information about air pollution is necessary for public health knowledge and action, however. The actions carried out by young people and their families to manage their exposure highlight some of the ways in which 'good' environments are (as shown in the interviews) or could be (as explored in the workshops) achieved in different situations. By studying wearable sensors in research practices, we demonstrate the value of recognising these more ambivalent "interconnections between bodies and data" (Radhakrishnan 2021) as occasions when air pollution is figured differently. This research hopefully opens up further points of inquiry, in terms of who benefits from personal data and how future figurations of air pollution might incorporate the social and environmental causes of exposure that are not currently available to computation.

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11

Figures of Speech: Stuck in the Middle with 'People Like You'

Celia Lury

Introduction

A while ago, my niece posted a photo of a takeaway coffee cup with her name on it on Instagram. Her name was misspelt. Her followers were asked to vote as to whether she should adopt the new spelling. When I spoke to her shortly afterwards, she observed that she has a friend who has a 'Starbucks name', that is, the name the friend gives when asked for her name in Starbucks' franchises. Another of her friends apparently says his name is 'My drink', which my niece described as 'a bit mean'. I used to give my proper name, spelling it out from a vague sense of sympathy with the person requesting the name but, on reflection, just introducing an unwanted teacherly or surveillance dynamic to the interaction. My niece said that she enjoys seeing the misspellings of her name. A friend of mine says that she gives the name of the person asking her—the name, that is, that the employee is required to display as part of their uniform.

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I just managed to stop myself doing this recently when I was asked for my name: the woman who asked wasn't wearing a name badge but an apron with the restaurant chain name on it. In a different food chain, my daughter says that customers are required to give orders via an iPad and are automatically given the name of a celebrity. She says she would prefer to be given a number.

I start with this everyday example to foreground what is common knowledge: that naming is socially significant as a mechanism for the identification of persons, and as such is routinely subverted in (sometimes mean, sometimes mundane, sometimes humorous) practices of misrepresentation, anonymization, subterfuge and impersonation. There are many points of interest in this example—the use of first names alone, the asymmetries involved in the use of names by employee and customer, the subsuming of personal names by company or celebrity names, the limited opportunities for expressions of recognition and solidarity and so on. In what follows I want to consider some examples in which persons are constituted in the use of names, pronouns and numbers: the organization Not In Our Name (NION) and the hashtags #JeSuisCharlie and #MeToo. All three examples, I propose, may be understood as figures of speech, understood to mean a word or phrase that entails an intentional deviation from everyday language use—spoken or written—in order to produce a rhetorical effect.

As part of a collaborative project on personalization (https://peoplelikeyou.ac.uk/),[1] I focus on four inter-related dimensions by which these figures of speech constitute persons. First, I am concerned to show how each figure constitutes a simultaneously singular and plural person. Second, I am interested in the role of participation, making a distinction between 'participating in' and 'being part of'. The questions I want to ask in this regard are: who is included, who is excluded in these simultaneously singular and plural persons when they are constituted by figures of speech? Does anyone belong? A third concern is whether how and how the figures might be understood to constitute proper or improper

[1] 'People Like You': Contemporary Figures of Personalisation is a Collaborative Award in the Medical Humanities and Social Sciences funded by the Wellcome Trust Foundation (205456/Z/16/Z).

persons, where 'proper' is used to reference property (including in the self), propriety, appropriation and appropriateness. In doing so I draw on understandings of the proper as the ability to circumscribe place (Bourdieu 1980; de Certeau 1980). My exploration will address how place or territory is circumscribed in these examples by linking the making of place or territory to recursive mechanisms of participation. The fourth and final concern is epistemological, that is, the concern is whether and how the persons constituted in the figures of speech I describe can speak the truth. The conclusion brings these concerns together in a proposal that what distinguishes the persons of #JeSuisCharlie and #MeToo is that they are 'stuck in the middle' with 'people like you'.

Pronominalism

While I will go on to consider the role of names and numbers in constituting these examples of persons as part of figures of speech, I start by introducing a variety of ways of thinking about pronouns. I begin with Emile Benveniste (1971 [1956]) since he explicitly addresses their role in relation to the category of person, arguing that they enable persons to be established in a specific relation to the act of speaking. Importantly, the referential relationship the personal pronoun creates is described as circular: it refers to something when it is used, and what it refers to is this use itself, that is, the speaker's self-reference and the referentiality of the message are co-constitutive.[2] Over and beyond this, Benveniste further proposes that some pronouns, specifically first- and second-person pronouns ('I' and 'you' in English), are distinguished as the only 'personal' pronouns on the grounds that they alone call into existence an unrepeatable object:

> "I" designates the one who speaks and at the same time implies an utterance about "I"; in saying "I," I cannot *not* be speaking of myself. In the

[2] Relatedly, Jacques Lacan and other psychoanalysts and political theorists identify what they describe as a splitting or doubling between the subject of the enunciation and the subject of the statement, exploring the implications of this splitting or doubling in language for subjectivity and political agency.

> second person, "you" is necessarily designated by "I" and cannot be thought of outside a situation set up by starting with "I"; and at the same time, "I" states something as the predicate of "you." But in the third person a predicate is really stated, only it is outside "I-you"; this form is thus an exception to the relationship by which "I" and "you" are specified. Consequently, the legitimacy of this form as a "person" is to be questioned. (1971: 197)

For Benveniste, the first and second personal pronouns or person forms are further uniquely characterized by their 'oneness': 'the "I" who states, the "you" to whom "I" addresses himself are unique each time. But "he" can be an infinite number of subjects—or none' (1971: 199). For Benveniste, the uniqueness inherent in the 'I' as a figure of speech means there can be no genuinely plural form of the first person. Instead, he describes 'we' as a 'junction between "I" and the "non-I"' in which 'I' is dominant or transcendent:

> This junction [of 'I' and 'non-I'] forms a new totality which is of a very special type whose components are not equivalent: in "we" it is always "I" which predominates since there cannot be "we" except by starting with "I," and this "I" dominates the "non-I" element by means of its transcendent quality. The presence of "I" is constitutive of "we." (1971: 202)

On this basis, he distinguishes between what he calls the undifferentiated 'we' of Indo-European languages and the two distinct forms present in some Amerindian, Australian and other languages—commonly described as the 'inclusive' and 'exclusive' forms 'I + you' and 'I + they'.

In a related strand of thinking, Roman Jakobson (1971 [1956]) describes personal pronouns as shifters, that is, as words whose reference shifts in each use. In his analysis of pronouns, Jakobson is especially concerned with the first personal plural ('we' in English),[3] the collective subject of which he also recognizes to be uncertain. To formalize this uncertainty, he develops a distinctive approach that makes use of cybernetics and information theory to emphasize the importance of

[3] Jakobsen's emphasis on the distribution of 'we', so Julia Kursell argues, stems from his wish to act as a kind of linguistic diplomat in the Cold War, both 'present in and absent from the Soviet Union' (2010: 221), writing about Russian verbs from the US, having left Russia in 1920.

relations between a message and its underlying code. This enables him to introduce two general distinctions: 'one between language and that which it narrates, and one between an event and its participants'. 'Four items', he says, 'are to be distinguished, a narrated event, a speech event, a participant of the narrated event, and a participant of the speech event, whether addresser or addressee' (1971: 133).

In a discussion of pronouns in English literature, John Frow introduces the claim made by some linguists:

> that all the selves performed or implied by language are figures of speech, figures of the self which may in turn be embedded in multiple reflexive layerings, not only in the direct and indirect quotation of others or ourselves but in mockery, in "taking off" another person, in acting, in the citation of adages or scraps of unattributed speech, in innuendo, and in all the "keyings" by which we shift from one register to another; from one figuring of the self to another. (Frow 2016: 164-5)

However, he stresses that while deictic markers such as pronouns involve the establishment of a reference point in both speech and writing, they are like and unlike in that 'both work with a temporal reference point, but in writing it is not necessarily equivalent to the time of enunciation' (Frow 2016: 168).

Frow is specially interested in 'free indirect discourse', which he describes as combining personal and impersonal narrative modes. He draws on literary examples to develop this analysis, using them to argue both that Benveniste is mistaken in proposing that only the first and second person can point to subjectivity, and to show that the use of pronouns may involve shifts in the speaker/addressee relationship. In describing these shifts he draws on Brian McHale's notion of integrational reading and the 'vertical' or 'mimetic context', what McHale calls the text's 'reconstructed level':

> Among the things readers know how to do with texts is to reconstruct, taking their cue from the actual sentences of the text, entities not actually given by those sentences "in so many words." Such entities include characters' psychologies, relationships among characters, fictional worlds, and

> even attitudes (e.g., irony), themes, and "ideas" in the largest sense—as well as … voices and speaking positions. (McHale 1983: 34 in Frow 2016: 172)

But Frow further adds that such shifts may also include shifts in the speaker-addressee pair (i.e., the speaker/addressee pair may change as well as the relationship between any individual speaker/addressee pair). In the movement of these shifts, he suggests, it is possible to identify the shifting perspective of a 'narrating instance', and it is this (both impersonal and personal) perspective that constitutes free indirect discourse. Concluding with Agamben, he suggests that entry into discourse

> takes place in the endless occupation of the deictic shifters which at once situate me and render me discontinuous with myself, or rather constitute my self as a site of shifting reference. That passage through the empty places of the pronouns and the persons of the verb is something like a journey through nonbeing, a constitution of the subject in the experience of absence. The pronoun system, like the characters who occupy it, guarantees identity and the dispersal of identity in the same articulation. (Frow 2016: 180)

These approaches to pronouns are introduced here to show the complexity of the ways in which their use may constitute persons. In the analysis of figures of speech that follows it will be supplemented by a consideration of numbers as well as names.

Figures of Speech

Not In Our Name (NION) was the name of a US organization founded in 2002 to protest the US government's response to the events of 11 September 2001. Its Statement of Conscience called on the people of the US 'to resist the policies and overall political direction that have emerged since September 11, 2001, and which pose grave dangers to the people of the world'. The organization was disbanded in 2008. A version of the organization's name—'Not in my name'—was adopted as a slogan as part

of public demonstrations in cities across the UK to protest the involvement of the UK government in the war against Iraq in 2003.

In this example,[4] the capacity for the (possessive) personal pronoun 'our' to act as a shifter is muted by its containment as part of the name of a collectively constituted organization (that has a Conscience). And the propriety of this collective name is itself secured through the ways in which individual membership is accomplished by signature, since signatures are a way to indicate a unique individual whose persistent existence—continuous across time and space, independent of context—is legally recognized (Frow 2002). The figure of speech that is composed in this example of the use of a pronoun is thus a properly circumscribed collective entity comprised of many unique 'I's, ones or proper individuals. The existence and identity of the collective entity and the singular individuals who comprise the entity are understood to be independent of each other and to be context-independent, only temporarily sutured by a signature and a (capitalized) name. Nevertheless, while its capacity to be a shifter is restricted, attention to the use of the pronoun 'our' in the name Not In Our Name encourages us to see that the circular logic of identification of persons as individuals that is involved here relies upon a short-circuiting. It is the political and legal authority of the state—including the maintenance of an apparatus of naming, including registers of birth, marriage and death, as well as laws of forgery and impersonation—that allows signatures to be used as legitimate identifiers of both individuals and organizations. In short, it is the state apparatus that gives legitimacy and political efficacy to the address made by this simultaneously singular and plural figure of speech to government.[5]

[4] Amongst other uses of this phrase revealed by a Google search at the time of writing, I found that 'Not in my name' has been adopted by a British Muslim organization, The Active Change Foundation, whose website states, 'As British Muslims we utterly condemn ISIS who are abusing the name of Islam with their acts of terrorism'. And the same slogan is also being used in religious and political protests relating to the slaughter of cows in India.

[5] 'By becoming legal, the proper name enters a whole network of apparatuses (demographic records, criminal records, fiscal records, voting records, immunization and health records) through which the state can both identify an individual and effect calculations and operations whose domain is the population. From the state's standpoint, fixing a reference—that is, ensuring that a legal name identifies one and only one subject—is … an essential precondition of modern politics' (Deseriis 2015: 23).

However, when the words 'Not in our name' or 'Not in my name' are not used as names but are statements of conscience appearing on a placard carried by someone at a demonstration, the specific person or persons to which 'my' or 'our' refers shifts. While relying on the symbolic convention that the person holding a placard intends or motivates the meaning of the statement on the placard, the figure who speaks is not given a unique, fixed identity and is not accorded a prior or future existence. That is, when 'Not in my name' is inscribed as a statement on a placard that moves from one individual to another, and no name is given, the personal pronoun references a transient individual-among-other-individuals, a not-quite-proper person. The individuals if or when they carry the placard are individuated, but they are identified not in their uniqueness but in equivalence or sameness (although they may of course be identified as unique individuals in practices of surveillance, including automated facial recognition, a technique in which a part of the body is constituted as an involuntary signature by the state or some other surveillant entity).

As the placard moves from person to person, as there is a figuring of one self to another, *my* 'Not in my name' has the same standing as *your* 'Not in my name'. In short, the meaning of the words on the placard is not tied to the identification of 'you' or 'me' as unique (context-independent) individuals but to 'our' indication—a pointing out—as an individual member of a (context-specific) 'we', of one-among-other-ones. While it is possible to work out that one of the intended addressees is the government (in part, perhaps, because of some other aspects of the context of use, such as the route of the march which the placard holders follow), we can also infer that the individual indicated is also addressing other individuals, who by their co-presence, can point to and be pointed out to each other. Making a 'we' that is an 'I + you' is one of the ways in which the solidarity of this figure of speech is given substance even if it loses form, as when it becomes a crowd in which the '+ you' might become a '+ they'.

The hashtag #JeSuisCharlie emerged on Twitter in 2015, following an attack by gunmen at the offices of the French satirical magazine *Charlie Hebdo*. Two days after the event, the hashtag had been used over five million times on Twitter, making it one of the most popular topics in the

platform's history. It was soon joined by #NousSommesTousCharlie. Most uses of these French-language hashtags were not from French accounts. Immediately following their appearance, another appeared—#JeNeSuisPasCharlie, although in much smaller numbers (just over 74,000 in the first few days). Other hashtags included #JesuisAhmed ('I am Ahmed', in reference to Ahmed Merabet, the police officer who was shot outside the Charlie Hebdo offices by the same gunmen who killed members of the magazine's staff). Later that year, Willem, one of the cartoonists employed at the magazine declared, 'We vomit on those who suddenly declared that they were our friends' (http://www.lepoint.fr/societe/willem-vomit-sur-ceux-qui-subitement-disent-etre-nos-amis-10-01-2015-1895408_23.php).

In the use of the hashtag #JeSuisCharlie, the use of a name alongside the pronoun 'Je' does not restrict its capacity to act as a shifter. While Charlie is capitalized as a proper name, it is not functioning properly.[6] The 'Charlie' of 'I am Charlie', we may infer, if we are aware of the events of the attack on the magazine *Charlie Hebdo*, is a shortening of the magazine name, the first part of which is said to refer to both the cartoon character Charlie Brown and Charles de Gaulle, a former French President, with the second part, Hebdo, short for *hebdomadaire*—'weekly'. However, as the hashtag was used again and again, as the number of speech events aggregated, as one self was figured to another, it was also possible to infer that the 'I' in this figure of speech was not an employee of the magazine. Indeed, as the number of hashtags associated with this phrase grew in size, as it appeared many, many times a day not just once a week, it became clear that the fact that the hashtag user who said, 'I am Charlie' was *not* a member of *Charlie Hebdo*, was the point.

However, although I earlier gave numbers that attest to the widespread use of the hashtag, there was uncertainty as to how the collective nature of the subject of this figure of speech was to be understood. While Robert Payne argues that 'the contagious complexity of the slogan cannot be captured by quantitative measurement of tweet volume and frequency',

[6] The propriety of speech is regulated in a range of ways across platforms: a Facebook page called 'We Are All Khaled Said', which was a focal point in Egypt's revolutionary movement, was deactivated by Facebook on the grounds that the account holder, Wael Ghonim, had used a pseudonym (Tufekci 2017).

he also suggests that the hashtag was a 'mass demonstration of individualised solidarity' (2018: 279):

> the individual Charlie *is* the collective, united in defence against attack upon any one of its members and the values that each embodies. … the performative function of mass repetition of the speech act '*Je suis Charlie*' serves to inaugurate a new subject who seeks recognition within a restricted field of norms. The paradox of this subject is that its singularity emerges only through multiple acts of individuality, none of which is fully autonomous. No single Charlie originates the subject position from which all claim to speak. (2018: 281)

In contrast, Inka Salovaara-Moring (2015) argues that '*Je suis Charlie* functions as a non- or post-human agent that tells a story on the behalf of *we*, *the assemblage*. Using Charlie as "*we*" does not only define the action and experience, but the narration itself'. However, this assemblage is also understood to approximate a subject: she says,

> In the digital media ecosystem, the implied 'agent' is almost irreplaceable. The narrative structure including 'we' ('black people', 'freedom fighters', 'Muslims') provides a narrative with an ideological trajectory. The connection between time, space, narrative and history becomes clear as the group achieves a reflexive self-awareness as a 'subject' that is analogous of the individual. (2015)

The suggestion here is that this figure of speech is not composed as a collective entity of unique, independent ones or even of one-among-other-ones, but as a more-and-less-than-one.

As such, it is perhaps not surprising that as the figure of speech came into existence, the impropriety of the speech act elicited a critical response from others. Payne observes that

> one user is irritated by and cynical about the Charlie movement: '*comment ça m'énerve ceux qui mettent "je suis Charlie" et qui n'ont jamais entendu parler du journal Charlie hebdo, tt ça pr follow le mouv*' ('It really annoys me how people post "Je suis Charlie" and have never heard of the paper Charlie Hebdo, all just to follow the movement'). … Another user labels the opportunists more bluntly: '*Et y'a les moutons qui te mettent "je suis Charlie"*

> *partout*' ('And here are the sheep posting "Je suis Charlie" everywhere'), followed by a 'suspicious face' emoticon. (2018: 284–5)

He concludes with the suggestion that for some users, 'Charlie supporters lack sincerity, individuality and knowledge of context' (2018: 284). The contexts most commonly invoked as lacking—by participants and analysts—were those of nation and race.

Camille Robcis (2015) notes that some 'commentators seem particularly upset by the British and American insinuation that the content of *Charlie Hebdo* might indeed be read as racist and, consequently, that one may condemn the murders without embracing the identificatory universalism that [French Prime Minister] Valls and others have called for' (Robcis 2015). Some users, she notes, interpreted the use by other users of #JeNeSuisPasCharlie as the 'hypocrisy and shared misunderstanding of what were sometimes called Anglo-Saxons'. In another commentary, Alana Lentin (2018) describes the event of Charlie Hebdo as an example of a 'white context' requiring 'black analytics'.[7] Her argument is that the appeal for the need to understand the 'French context relied on a "white analytics" that opposes the centrality of race as an interpretive framework that a "black analytics" foregrounds'.[8] In making this argument, she unpicks the politics of 'the urge to contextualise' (2018: 52):

> the proposition that providing French context could overcome what were portrayed as misreadings of the reasons for and backdrop to the attacks on Charlie Hebdo did not complexify these rationales. Rather, because the context provided did not engage with an epistemology of black analytics, it could not ultimately dispel the tendency to present a Janus-faced picture of French society—those who identified with a personified "Charlie" (republican, secular, white) and those who did not (communitarian, religious/fundamentalist, racialized). (2018: 49–50)

[7] She writes, 'I propose that the aftermath of "Charlie Hebdo" is a fitting example of the need for more attention to be paid to the lessons of Du Boisian double consciousness, an acute awareness of the other's world that endows Black and otherwise racialized people with an insight into the white structures in which they live' (2018: 47).

[8] See also Sanjay Sharma's analysis of 'Blacktags', the vernacular term for popular racialized hashtags, which, he argues, 'reveal the contagious effects of networked relations in producing emergent racial aggregations, rather than simply representing the behaviour of an intentionally acting group of Black Twitter users' (2012: 48).

The variety of these lay and academic analyses speaks to the complexity of the co-constitutive inter-relationship of a speaker's self-reference and the referentiality of the message. As previously mentioned, Willem, who was a contributor to the magazine, explicitly rejected the identification with 'Charlie' made by others. We can see this response as an assertion by Willem, in the shadow of his experience of an attack on his life and that of his colleagues, of the impropriety of anyone else asserting an existential link. Or, if we follow Jakobson, we can see his response as a denial of the right of others to participate in the narrated event through participation in the speech event. In contrast, those who responded by using #JeNeSuisPasCharlie opposed the sentiment of those speakers who said #JeSuisCharlie but accepted their right to participate in the narrative event by exercising their own ability to do so. In other words, one aspect of what is contested in this figure of speech is whether you can participate *in* an event without being a part *of* it, whether and how speech events and narrative events are articulated together and what kind of subjective or other agency, authority or credibility this layered articulation—or contextual integration—might afford.

Combining Jakobson with Lentin's analysis of the politics of contexting raises the issue of whether and how participating in and being part of come to be associated with belonging, place and territory. She writes,

> The suggestion that all speech is free belies the facts that speech uttered and heard is deeply unequal and that the different actors within it have varying degrees of freedom. An Australian example indicates this: Uthman Badar, the President of the Muslim group *Hizb-ut Tahrir*, was asked to address the Festival of Dangerous Ideas, an event with the tagline, "a series of talks that bring contentious ideas to the fore and challenge mainstream thought and opinion." However, Badar's presentation at the event … was canceled due to outrage over the topic of "honor killings," the subject the organizers asked him to address. As Randa Abdel-Fattah notes, as a Muslim, Badar was not allowed to have a "dangerous idea," because to do so would imply "that he is a Muslim of Australia, not a Muslim in Australia". (2018: 54-55)

Both the hashtag #JeSuisCharlie and the hashtag #JeNeSuisPasCharlie circulate in an algorithmic infrastructure in which context awareness is

difficult to say the least: across the platforms of digital media there is considerable potential for multiple possible confusions, tangles and confrontations in the circular self-(p)referencing and platform-induced dynamism of trending. Indeed, the event of #JeSuisCharlie can be seen as an instance of what Elena Esposito (2004) calls 'second-order blindness' and what Gregory Bateson (1972) calls schizmogenesis: the continual reproduction, confirmation and intensification of difference.[9]

Bateson developed the term schizmogenesis in an analysis of double-binds or double-takes, which he describes as examples of transcontextualism, a genus of syndromes or cognitive tangles associated with the 'more than circular' that arise when individuals learn—or fail to learn—how to deal with uncertainty in relation to context. At the heart of this genus, says Bateson, is the human capacity to deal with the 'weaving of contexts and of messages which propose context—but which, like all messages, whatsoever, have "meaning" only by virtue of [the] context' in which they are received (1972: 275-6). Contexts may set the stage for a 'certain class of response', but learning what changes and what stays the same across contexts is challenging, and 'breaches in the weave of contextual structure' are common. Certainly, in the case of figures of speech that emerge in social media, the layering that McHale identifies as part of a contextual or integrational reading seems likely to lead to multiple breaches in context, perhaps even making ground-truthing or providing a (common) ground for readings impossible to establish (Day and Lury 2017).

The MeToo Movement is a movement against sexual harassment and assault. Tarana Burke, a US social activist and community organizer, began using the phrase 'Me Too' to refer to sexual harassment in 2006. The hashtag #MeToo spread online in October 2017 following sexual misconduct allegations against Harvey Weinstein. The hashtag was first tweeted by the US actor Alyssa Milano around noon on 15 October 2017 and had been used more than 200,000 times by the end of the day

[9] In his work on populist reason, Ernesto Laclau speaks of how floating signifiers generate an equivalential chain, which 'has an anti-institutional character: it subverts the particularistic, differential character of the demands' (2005: 38). The 'internal frontier' of populism reproduces an us-versus-them discourse, a model of constant expansion. This model has a broad explanatory sweep which Ravi Sundaram (2015) refines by providing an account of how contemporary populist mobilization in India is embedded in the specific informational strategies associated with digital media.

and tweeted more than 500,000 times by the next day. On Facebook, the hashtag was used by more than 4.7 million people in 12 million posts during the first 24 hours. The platform reported that 45% of users in the US had a friend who had posted using the term.

In this example, as with #JeSuisCharlie, the relation between the singular and the plural, the one and the many, is continually being remade by the platforms in which the figure of speech moves. Also as in the case of #JeSuisCharlie, this example demonstrates that disbelief, doubt and speculation are the unavoidable outcomes of the serial calibration of signal and noise, in(ter)ference and (un)certainty across contexts. However, as well as triggering other tangential or derivative claims (#NotMeToo, #HimToo, #NotAllMen, #YesAllWomen, #BelieveWomen, #BelieveAllWomen),[10] some of the speakers in the movement are engaged in a series of trials—legal and otherwise, in which the relation of personal pronouns to individuals who can be and sometimes are named is being put to the test. In these contexts, the question becomes, is 'I' the subject of 'Me(Too)'? And if so, is the 'I' of 'Me(Too)' telling the truth?

Here I want to suggest that it's not necessarily helpful to say that this figure of speech participates in an era of post-truth. Or to say that truth is now 'after the fact'. According to Benveniste, personal pronouns—as self-referential signs—cannot be used incorrectly; as they do not state anything, 'they are not subject to the conditions of truth and escape denial' (1971: 220).[11] However, this is not Jakobson's view as becomes apparent in his discussion of the third person plural, 'we', which he describes as both a shifter and a non-shifter. For Jakobson, 'we' is a non-shifter insofar as, in many languages,[12] it conveys at least some

[10] Relatedly, see Emily Rosamond's discussion (2020) of how social impact bonds (SIB) operate as 'derivative character investments'. She writes, 'By depicting beneficiaries as better able to morally direct their lives, [SIB promotional videos] represent SIBs as path-changing devices, threading more fulfilling life paths through society. They encourage derivative character investments in bundles of bettered behavior, narratively linked to changed life paths at scale'.

[11] His explanation as to how this is so relies upon his understanding of correct or proper use: 'it is a fact both original and fundamental that these "pronominal forms" do not refer to "reality" or to "objective" positions in space or time but to the utterance, unique each time, that contains them, and thus they reflect their proper use' (1971: 219).

[12] Amia Srinivasan writes, 'In many … languages—including Malay, Finnish, Hungarian, Estonian, Armenian, Bengali, Persian, Ewe and Swahili—the problem of the gender-neutral third person pronoun doesn't arise, because of the absence or near absence of grammatical gender. In these lan-

information as to category of person, specifically information as to category of person (gender) and category of number (more than one) (Kursell 2010).

As is well known, the information conveyed as to gender varies significantly across languages. In current uses of the English language, however, the category of person—gender—is being supplemented by a category of number through the advocacy of the use of the third person plural—'they'—to indicate a (single) person of fluid, non-binary or trans-gender. There is a lot to be said about this but here I focus on the use of 'they' as a category of number to suggest that the kind of number called into existence is a distributive number,[13] a statistical number supported by, but not exclusive to, the calculation of digital data.

In ordinary English language use, a distributive number is a word that answers 'how many times each?' or 'how many at a time?', while the distributive property law in mathematics concerns the ordering or sequencing of arithmetical operations. Adrian Mackenzie (2016) draws on both these understandings when he suggests that distributive numbers should be the name for those numbers that emerge from the sequencing of the arithmetical operations of conjoining (adding, subtracting, multiplying and dividing) of probability distributions in complex statistical techniques such as Markov Chain Monte Carlo simulation (MCMC). He develops his analysis by suggesting that while MCMC is designed to individualize entities, the aim is to describe relations between individual entities or events that are neither identical to nor independent of each other. MCMC does this, he says, by individuating an entity by calculating how more or less similar the entity is to many others in probabilistic terms, specifically by identifying an individual entity or event as a *joint probability distribution* within different intersecting populations. The probability

guages, the same word is used for "he" and "she", and sometimes for "it" as well. In Ojibwe, an indigenous North American language whose nouns are not classified by gender but according to whether they are considered animate or not, the singular third person pronoun *wiin* is used for both "she" and "he". In Turkish, the equivalent of 'he', "she" and "it" is simply *o*, which seems to me unimprovable' (2020). Srinivasan also notes that while the American Dialect Society chose 'they' as its word of the decade in 2020, it has been used as a singular pronoun for over 600 years.

[13] The suffixes -some (as in twosome, threesome), -ly (weekly, annually, regularly) and -fold (as in two-fold, three-fold) are sometimes used. A conspicuous contemporary use of distributive numbers is in -arity or -adicity, to indicate how many parameters a function takes.

of any individual entity is thus understood as always distributed—added to, subtracted from, multiplied and divided—in relation to many populations in many times (in ordered sequence)[14] in time. Mackenzie writes,

> In post-demographic understandings of data, individuals appear not simply as members of a population (although they certainly do that), but themselves as a kind of joint probability distribution at the conjunction of many different numbering practices. If individuals were once collected, grouped, ranked, and trained in populations characterised by disparate attributes (life expectancies, socio-economic variables, educational development, and so on), today we might say that they are distributed across populations of different kinds that intersect through them. Individuals become more like populations or crowds. (2016: 116)

It is as an example of a personal pronoun that is also a distributive number, I suggest, that the #MeToo has the capacity to refute Benveniste's claim that 'I cannot *not* be speaking of myself' as a 'one'. That is, #MeToo is a platform-enabled participatory intersection of populations, in which as Mackenzie notes, 'the lines between objective and subjective, or aleatory and epistemic probability, begin to shift not towards some total computer simulation of reality but towards a refolding of probability through world and experience' (2016: 126). 'Me' is conjoined with 'Too' in a way that makes visible the short-circuiting that is made invisible in the use of signature and the popular social media phrase 'You do you', which both short-circuit recognition of the mutual constitution of self and speech.

As a figure of speech, #MeToo is simultaneously a person that is one and many, not as the addition of either unique independent ones or of equivalent ones but as a conjoint person or condividual (a dividing with) (Deseriis 2015). As such, it is an instance of free, indirect discourse, the (im)personal perspective of a constative (probabilistic) and performative

[14] This ordering of time in time is an important characteristic of written narrative as described by Frow. He writes, 'Impersonal narration shifts its deictic centre from the situation of utterance which is the norm for spoken language, to the spatio-temporal coordinates corresponding to the central or focalized character, or rather to whichever character is central or focalized at that point in the narrative' (2016: 168). The suggestion here is that statistical techniques provide opportunities for (parametric) focalization.

(participatory) practice of conjoining. It involves a pronominalism that involves a constantly shifting de- and re-aggregation of participation such that the 'we' that is 'MeToo' is simultaneously inside and outside both the relations 'I + you' and 'I + they'.[15] Indeed, it is perhaps because such figures of speech comprise wholes that are vague in the sense that they are simultaneously inclusively exclusive and exclusively inclusive (Agamben 1998; Verran 2007; Guyer 2014) that #MeToo provokes the emergence of competing 'totals' or 'wholes', including not only #NotMeToo, and #HimToo but also #NotAllMen, #YesAllWomen, #BelieveWomen, #BelieveAllWomen. This is also perhaps what makes the figure of speech that is #BlackLivesMatter a total or whole that is simultaneously 'bigger' and 'smaller', both 'more' and 'less' than #AllLivesMatter.

Stuck in the Middle

To conclude, I want to suggest that the analyses of these examples as figures of speech illustrate some of the limits and the possibilities of a non-representational politics: the challenges such a politics pose for understandings of persons, and the kinds of relations that can exist between the singular and the plural, the one and the many, the proper and the improper as well as raising questions about whether and how truth may be established. Can the performative 'I' of 'I *promise*' (to tell the truth, the whole truth and nothing but the truth) be rendered equivalent to the self-(p)referencing 'I' of 'I *like* this' or the 'I' that is more *and* less likely to be 'you' at this (and that) time? What kinds of causal relation between past acts and present responsibility—if any—can be established for these conjoint figures of speech? In what ways, if at all, can relations between '#MeToo' and 'you' be rendered equivalent to the relations that Benveniste identifies as existing in 'we' between the personal pronouns 'I + you', or even 'I + they'? In what sense can or should such claims be described as free speech?

[15] For Sanjay Sharma (2012), Blacktags 'are instrumental in producing networked subjects which have the capacity to multiply the possibilities of being raced online. … ethno-racial collective behaviours on the Twitter social media platform are grasped as emergent aggregations, materialized through the contagious social relations produced by the networked propagation of Blacktags'.

In a discussion of improper names (2015), Marco Deseriis introduces Slavoj Zizek's claim that the guarantee of 'the identity of an object in all counterfactual situations—through a change of all its descriptive features—is the retroactive effect of naming itself. It is the name itself, the signifier, which supports the identity of the object' (Zizek 1989: 94-95 in Deseriis 2015: 24). However, he also cites Ernesto Laclau who says 'the reverse movement also operates: [empty signifiers] can never fully control which demands they embody or represent' (Laclau 2005: 108 in Deseriis 2015: 25). Deseriis' own position—or wager as he puts it—is that 'rather than expressing heterogeneity or homogeneity, difference or totality, the improper is a mode of mediation between these two poles. This mediation is evident not only in the passage from the one to the many (and vice versa) … but also in the relation between signifying and a-signifying practices within the assemblage' (Deseriis 2015: 25).

Walter Benjamin proposes that a 'pure middle' is one whose middleness is not defined with respect to determinable end-points, but is, rather, an infinite and infinitely divisible space. Of this space, the critic Peter Fenves writes:

> Nothing can withstand this space intact: infinite divisibility is the 'law' of this space, which, however, cannot be posited as a law, since this division is never governed by an identifiable rule. The 'law' of this space, the rule by which its infinite divisibility is articulated, must likewise be infinitely co-divisible: in German, *mitteilbar*, which is to say, 'communicable'. (Fenves 2001: 255)

Clearly, the pure middle is an abstraction, but the implication of the introduction of abstraction into social life by way of media-specific operations of communicability is precisely what has been considered here. What has emerged across the analysis of these examples is the importance of considering media-specificity for the ways in which a speaker's self-reference and the referentiality of language are co-constitutive. In the last two cases, for example, the elements are data-points, and the connections, couplings or conjoints are the hashtags, [16] likes, shares, retweets

[16] A hashtag is a form of punctuation that both connects and divides, as well as being the symbol to indicate a number, or a unit of currency as well as a bone fracture and, in conjunction with @, an address or place.

and so on, which are brought into multiple and dynamic relations with each other in the distributive operations of platforms of all kinds. If we consider these couplings as the introduction of abstraction of a media-specific kind into social life, we can see we are not simply witnessing a proliferation of (im)proper persons, but are 'stuck in the middle' with 'People (more and less, sometimes and sometimes not) Like You', participating in and/or being part of a totality that is a vague whole (Guyer 2014). Both #JeSuisCharlie and #MeToo are figures of speech that cannot be summed up by the addition of either individual 'I's, unitary 1s or 'ayes', but rather constitute more or less proper persons, existing simultaneously inside and outside 'I + you' and 'I + they', for whom the circumscription of ground, place or territory cannot be finally determined.

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12

Ubiquitous Surveillance and Data Selves

John Frow

Are we made up entirely and without residue of the data that define us, or is there a disjunction between our data shadows and our embodied selves? How do we come to recognize ourselves, our selves, in the pronouns that interpellate us online, and what is it exactly that we recognize? What does it mean to occupy the semantic and positional space of the pronoun 'you'? And is there a continuity or a discontinuity between the systems of surveillance and data aggregation that address us and the systems that refer to us? The markers of identity generated by such systems work by both individuating and classifying us; this paper seeks to think about the range of possible relations between that generality and that particularity.

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Last year my (very latent) Facebook account was hacked and a figure bearing my name and my visual icon joined me up to a number of plausible sites, and a couple of somewhat less plausible ones, on which it then made pitches announcing special deals on gambling sites and promoting casinos. I've now withdrawn completely from Facebook so I can't tell whether this doppelgänger still represents me there, although given its apparent autonomy it may well have taken on a vampiric life of its own.

That's a first example of identity theft, one in which it's still quite clear which is the real and which the false John Frow: my doppelgänger 'represents' me and for some people may 'be' me, but for people who know me it will, I hope, be obvious that its words in support of gambling are unlikely to be mine. A second, equally banal example: a couple of years ago my wallet was stolen in Barcelona and my bank later traced the trail of my credit card up toll roads to Lyon, where it stopped, the card having been cancelled. My bank believed me, and someone's representation of themselves as me was labelled a misrepresentation. But consider a third possibility, that of a complete and successful theft of identity. Koopman (2019: 4-5) summarizes the resulting 'permanent and irreversible erasure of the entirety of [the victim's] personal information and therefore their entire informational identity' as follows:

> No driver's license, no passport, no bank account number, no credit report, no college transcripts, no employment contract, no medical insurance card, no health records, and, at the bottom of them all, no registered certificate of birth. The scenario is chilling: everyone around you well attached to their data while you are dataless, informationless, and as a result truly helpless. What would you make of yourself? What could others make of you? What would the bureaucracy be able to do when you petition it with your plight, given the fact that no bureaucracy can address a subject as other than their information? … They would have no way of addressing you from one day to the next, of recording you in their databases, of numbering or naming you, and so no way at all to deal with you on anything approaching a consistent basis. You could not even receive special support through special court orders because, completely unrepresentable as information, you would have no way of being registered into a court, for that would require rendering you into the data from which you have been detached.

The subsumption of personhood into documentary information that is evidenced in the case of identity theft has its beginnings with the governmental systems of early modernity, when a proliferating apparatus of writing begins to integrate verified identities in cadastral and demographic records and to generate both a systematic scrutiny and the rights and recognition accorded by the state to those verified identities. The paradox at the heart of this process is that, while an identity document purports to be 'a record of uniqueness', it must at the same time be 'an element in a classifying series' (Caplan and Torpey 2001: 8). And the converse of that dichotomy is the further paradox that these mechanisms of construction, verification, scrutiny and control are at the same time lived by me as the confirmation of my uniqueness, my being as a person. Personalization in this sense is a function of generality, 'a mode of individuation in which entities are precisely specified by way of recursive inclusion in types or classes' (Lury and Day 2019: 18). My documents identify me not only as 'the' person that I am but as 'a' person, one of *those* persons, one of those entities that are classed as persons; and as a member of all those other classes of human being that count and that make me count for this act of classing.

Individual identity is legally underpinned by the documents of state, but, as Ruppert (2011: 218) writes, 'people are not governed in relation to their individuality, but as members of populations. The embodied individual is of interest to governments in so far as the individual can be identified, categorized and recognized as a member of a population. This is the general problematic of governing, which is to know the nature and then govern and regulate the forces of the collective body'. Populations are known and made legible—indeed, are constructed as populations—by means of devices and practices of identification of individuals as categorized subjects, 'an element in a classifying series'. The basic identifiers for governmental scrutiny are the biographical data that register a name, a set of kinship relations, a gender, an ethnicity, an address; in addition, biometric data record certain unique physical attributes or habits of bodies (facial structure, fingerprints, iris geometry, height, gait). The biographical data move outwards to the set of social relations within which they are meaningful; the biometric data move centripetally to identify a singular body differentiated from all other bodies. What is of interest to

the state may be either the general category (Which classes of people have need of particular social services? What is the desirable distribution of resources across a particular population?) or hypothetical individuals apprehended as members of a category (Which particular neo-Nazis or radicalized Muslims are likely to espouse violence? Which former chemistry teachers are likely to be cooking ice?). In each case the state will aim to build up a coherent picture through the use of statistical evidence, or through a cumulative record of transactions between an individual and the various branches of the state or commercial institutions (driving license, criminal record, medical records, property holdings, and so on). It will identify patterns of group circumstance or patterns of individual conduct, and it will seek to amass and correlate patterns of information across whatever databases are at its disposal.

Those databases are now for the most part digital, and thus susceptible to algorithmic operations of search and analysis which build 'what is uncertain and unknown into the identity calculation itself' (Amoore 2008: 25). In the case of national security systems, such speculative uses of data, monitoring whole populations in quest of individual anomalies, are intended to generate as-yet unsuspected patterns rather than to find evidence to support known possibilities (Raley 2014: 123). They bring into being what Amoore (2011: 27) calls a form of data derivative, meaning 'a specific form of abstraction that distinctively correlates more conventional state collection of data with emergent and unfolding futures'; the data derivative comes into being from 'an amalgam of disaggregated data', sorted by way of recursively refined algorithmic association rules and given visual form as 'risk map, score or colour-coded flag' (Amoore 2011: 27). It might, for example, be derived from an associative matrix connecting a flight destination, fare payment by a third party at short notice, a dietary choice, and a history of attendance at a religious institution. The knowledge formed here is 'actuarial' (Andrejevic 2012: 95), converting 'the databased residue of daily life' (Amoore 2009: 52) into an actionable probability. A risk value is assigned to an individual, and this pre-emptive identification allows the analyst either to read outwards to the 'nodes of connections between data' (Bauman et al. 2014: 125) (i.e., the network of a suspect's personal connections) or to act to avert an immediate threat. The data derivative is 'indifferent to the contingent

biographies that actually make up the underlying data'; it 'is not centred on who we are, nor even on what our data says about us, but on what can be imagined and inferred about who we might be – on our very proclivities and potentialities' (Amoore 2011: 28). To my singular body it attaches a virtual state, my data shadow, which then defines me.

Edward Snowden's revelations about the US National Security Agency identified a range of forms of Internet surveillance, among the most prominent of which are, on the one hand, the PRISM programme, which, through its XKEYSCORE software, allows analysts to read from the servers of Internet service providers every keystroke of every person's online activity; and, on the other, the direct upstream harvesting of data from private-sector Internet infrastructure—'the switches and routers that shunt Internet traffic worldwide, via the satellites in orbit and the high-capacity fiber-optic cables that run under the ocean' (Snowden 2019: 122). This is genuinely ubiquitous surveillance. Yet note that it's difficult to draw a clean line between such state surveillance and the data-harvesting capabilities of corporate information harvesters and brokers, with some of which—Snowden mentions 'Microsoft, Yahoo!, Google, Facebook, Paltalk, YouTube, Skype, AOL, and Apple' (Snowden 2019: 122)—the NSA has a closely symbiotic connection.

A number of different kinds of commercial corporation harvest data on Internet users: retail corporations, search engine operators, social media companies, data brokers, data analytics providers, and so on. Apart from data-broking and data-analysis firms, which sell information directly to their clients, the business model on which these corporations run is personalized advertising based in the interactive capacity of digital media, with harvested data either used directly, in the case of retail firms, or auctioned off to advertisers in the case of search engines and social media companies. The pioneers in the field were probably the giant consumer credit bureaus like Experian, Equifax, and TransUnion (cf. Lauer 2017), and retail corporations like Walmart and Amazon in the US and Tesco and Marks and Spencer in the UK, which hold and monitor massive amounts of data on the contact details, purchasing history, and lifestyle preferences of their customers, along with all the ancillary information that flows from it (financial status, sexuality, mobility, physical fitness, cultural tastes, dietary and pharmaceutical choices, and so on). But the

field of personalized advertising is now dominated by the two biggest players, Google and Facebook, with the other three technology giants, Microsoft, Apple, and Amazon, integrated into the field in somewhat different ways.

Let me take Google as the key example here. In Shoshana Zuboff's comprehensive account, the dot.com crisis of 2000 provided the occasion for Google's founders to abandon their initial strong opposition to advertising. Two conditions allowed the company to transform online advertising, particularly after its purchase of DoubleClick in 2008 (Cheney-Lippold 2017: 20) and as it came to realize that it was indexing not only, at an aggregate, topological level, the entire network but also a second world, that of individual users, which it then overlaid on the first in order 'to deliver relevant search results to the users, and to deliver relevant users to advertisers' (Stalder 2010: np). The first condition it satisfied was that its computational tools and infrastructure enabled it to create user profile information from analysis of search patterns, keystroke by keystroke, and to match advertisements to the user's interests as they are deduced from these traces of online behaviour. The second condition was its development of an options-based pay-per-click revenue system which it carried to the contextual advertising system it established for its search engine and for Gmail, such that when an advertiser bids for a keyword the system tracks those of the user's searches that are contextually relevant for it (e.g., a search for online clothing), matches the user to a product range, serves the advertisement, and, if the visitor clicks on it, invoices the advertiser for the price negotiated for that particular user profile—all in real time (Turow and Draper 2012: 135).

Unlike older business models targeted only to keywords or content, Google was thus able to tailor advertisements to the interests, the social connections, and the physical and online locations of a particular user, and it did so by collecting stores of what Zuboff calls 'behavioral surplus', which embrace 'everything in the online milieu: searches, e-mails, texts, photos, songs, messages, videos, locations, communication patterns, attitudes, preferences, interests, faces, emotions, illnesses, social networks, purchases, and so on' (Zuboff 2019: 128). Hence the expansion of Google, Facebook, Amazon, and Apple into the Internet of things: a world of information-gathering devices, each of which is 'a slightly

different configuration of hardware, software, algorithms, sensors, and connectivity designed to mimic a car, shirt, cell phone, book, video, robot, chip, drone, camera, cornea, tree, television, watch, nanobot, intestinal flora, or any online service' (Zuboff 2019: 129).

We all have a sense of the sheer scale of the enterprise: in 2020 there were 6.9 billion Google searches a day and the company generated $116 billion, 97% of its total revenue, from advertising sales.[1] Its subsidiary company YouTube had 2 billion monthly users in February 2019, Chrome had 62% of the browser market globally, Android had 2 billion users in mid-2017, and Google Maps and Gmail each had well over a billion users. The services that Google and its parent company Alphabet offer are multifarious, but their aim is singular: to collect behavioural data about individuals that can be monetized as advertising revenue. As Zuboff puts it: 'With click-through rates as the measure of relevance accomplished, behavioral surplus was institutionalized as the cornerstone of a new kind of commerce that depended upon online surveillance at scale' (Zuboff 2019: 83).

The collection processes employed by Google and other commercial entities are structurally homologous with those of state intelligence services. 'Online surveillance at scale' harvests information that had never previously been captured at scale—'about people's time-space paths through the course of the day, the details of when and where they chat with friends, even the random queries that drift through their minds (to the extent that these are transformed into Google searches)' (Andrejevic 2012: 93)—and it does so by making use of algorithmic procedures, such as mathematical association rules, which move between the commercial sphere where they were initially developed and that of national security apparatuses (Amoore 2008: 26).

But the ubiquity of surveillance doesn't mean that we live in a world of totalized panoptic control. Mark Andrejevic has suggested the alternative metaphor of a world made up of a series of distinct but sometimes overlapping digital enclosures, meaning the coverage range created by the interactive and data storage capabilities of any digital surveillance technology—a world characterized, then, 'by a proliferation of different

[1] https://techjury.net/stats-about/google/, drawing on statistics from TechCrunch and Statista.

monitoring networks with varying capabilities for information capture under the control of different entities' (Andrejevic 2012: 93). Under certain conditions (e.g., a totalitarian government such as that of China with a tight hand on the public domain) data from a number of different enclosures might be aggregated; and security agencies such as the NSA do in practice make use of commercially gathered data, either by stealing it or by exploiting software vulnerabilities or merely by requesting access to it. This is an area in which tech companies in the West are, or want to be seen to be, pushing back, but probably the most we can say about this is that the balance between privacy and omnivorous data collection is precarious and in a state of considerable flux. Further, the coexistence of digital enclosures within an overarching assemblage means that information collected for one purpose—the mapping of the built environment by Google Earth, for example, or the monitoring of the flow of water or electricity or traffic—might be migrated 'across a range of other, sometimes unanticipated functions' (Andrejevic 2012: 93; cf. Lyon 2014: 5-6, 8). The trade goes both ways, with technologies and software developed for military or security purposes finding their way into the surveillance activities of business—or, more precisely perhaps, with an increasing lack of differentiation between these spheres.

The identifying and personalizing data that we yield through digital interactions may be given voluntarily or involuntarily. Involuntary generation of data takes place by means of cookies or other tracking devices which introduce memory, or statefulness, into a stateless system such as the basic Internet protocols (Sipior et al. 2011: 3), and they are thus deictically charged: localized in time and space to a particular Internet subject. Alternatively, the involuntary generation of data takes place by way of the network of automated sensors (facial recognition systems, RFID tags, location tracking, the plethora of sensors on any smartphone, and so on) that cover our world, directly registering traces of our bodily presence in space and time (Kang and Cuff 2005: 94). In some instances we may give permission for our data to be collected; but since the alternative is not to use the interface at all, and since privacy agreements tend to be unreadably lengthy and legalistic, the permission can only technically be said to be voluntary: it is in effect a function of 'a regime of compulsory self-disclosure' (Andrejevic and Gates 2014: 191).

The prevalence, on the other hand, of *voluntary* disclosure of personal data seems, given its value for commercial exploitation or for scrutiny by the state, to require some explanation. 'We need to understand', writes Koopman (2019: viii), 'why we do not question, and why we even eagerly participate in, projects of government data harvesting and corporate data collection, and a raft of programs designed to store and analyze every flake of data dandruff we cannot help but leave behind in nearly everything we do'. The explanation—beyond the sheer usefulness of centralized medical or administrative databases—surely has to do with what it is that digital interaction offers: a mode of sociality, the affirmation of a sovereign self, pleasure in the construction and display of a public self, and the promise of '*genuine* individuation', such that 'disidentification will no longer be necessary as a way of maintaining individuality in a scene of falsely personalized address' (Cohen 2019: 174). In a context of unfathomably complex communications, the 'practical consciousness' of digital subjects works as though communication were unproblematically immediate and intimate and is built on an imaginary of 'sovereign control, a sovereignty of self-hood' manifested through willing personal disclosure (Bauman et al. 2014: 138). Such disclosure is part of 'a sharing practice involving mutuality and reciprocity rather than a one-way flow of information' (Raley 2014: 133); the gift of free labour to websites forms a community, a set of social relations, a commons. Constructing a profile and engaging in Facebook's 'Like' economy, for example, 'transforms users' affective, positive, spontaneous responses to web content into connections between users and web objects and quanta of numbers on the Like counter' (Gerlitz and Helmond 2013: 1358).

Digital disclosure, in generating value, is formative of social relations; this is that double movement by which the Internet takes the form of being 'always and simultaneously a gift economy and an advanced capitalist economy' (Terranova 2000: 51). The social media profile and timeline and accumulated posts and the acts of friending and liking and rating make up 'a presentation of persons' (Koopman 2019: 7): a composition of the self that persists across time and across digital space. Made entirely out of data—out of stories, images, affects, arguments, observations—it corresponds to that other presentation of persons that is formed *without* my willing it from the algorithmic compilation and analysis of tracked

online data and that may convert it into value. My profile, freely offered to the world, is one of the dual sources of the profiling, the 'reputation', that sells me to advertisers or that defines me for the state.[2]

Taken together, the regimes of voluntary and involuntary disclosure thus construct what Goriunova (2019: 126) calls the *digital subject*, a concept that includes 'a subject of a data profile or of a Facebook stream, a history of browsing or search engine queries, mobile phone positioning records, bank transactions, sensor data, facial recognition data, biometric movement recognition data, or email inboxes, among other things. The digital subject thus moves between captured, unique, and persistent biological characteristics and premeditated forms of symbolic expression, judicially inferred subjects of actions, and performed identities'.

One important way in which commercial differs from state surveillance is that in most instances the state works in the third person—it talks to itself *about* its subjects—whereas commercial surveillance converts its descriptive data into second-person address. Online advertising forms a vocative self: a self substantiated by the nameless and invisible voice that addresses me. Here's how it speaks to me—a few sentences taken at random from websites I've recently visited:

> *Discover the 7 steps to harness your ambition and rescue your dormant business*
> *Lego Marvel Avengers: Create the Ultimate Quinjet. Shop Now*
> *Try Prime Video Free*
> *Go Now, Go There, Go Anywhere*

In each of these examples the pronoun 'you' is silently embedded in an imperative that works ambiguously as both an order and an invitation: an anonymous speaker addresses me as a subject who is invited or ordered to attend to an injunction. The speech lacks authority, since I don't know who is speaking, and although these sentences are in the imperative mode they have no power to compel other than by awakening my interest—a remote chance, since I don't run a business, dormant or otherwise, or want to know what a Quinjet is or to accept an offer that I understand is meant to hook me into a subscription I don't need, or to buy a new car.

[2] On what she calls 'ubiquitous online reputation calculation', cf. Rosamond (2019).

And this 'you' that is addressed to me is at once specific and indistinct, neither singular nor plural but somehow both at once, a generalized addressee who is nevertheless me alone, the sole receiver of these words.

When the crooner asks, 'Who … stole my heart away?' and answers, 'No one but you', we don't know who this 'you' is, other than that he or she has the attribute of having stolen the singer's heart away; we don't know which person might fill this empty slot. We do know that it's not us, the persons listening to the song and in some, perhaps indirect sense being addressed by it: this 'you' passes to the side of us. But the identity of the 'you' can be subsequently specified, either within the song—by being given a name, for example—or by the adducing of external information, perhaps about the singer's or songwriter's biography. In conversation between two people the contextual specification of the pronominal shifter is in the first instance total: 'you' is the other partner to the dialogue. Given the citational capacity of all speech, however—our tendency to weave the speech of others into our own—the specification may be more complex. When more than two people are present in a conversation the reference of the second-person pronoun may require disambiguation; in this case the referent of the pronoun will be the most likely or most salient candidate in the contextual field. In the case of written texts, the reference of second-person pronouns is always in a sense an act of simulation, a pretence that the openness of reference has always already been filled, that the nameless reader was always the one intended to receive this word. Seeming to single me out, personalized online address has the off-key familiarity of intimate words spoken by a stranger.

The uncertainty of deictic reference is at the heart of the process of contextual specification that we know as the interpellation effect: a process of conversion of a non-specific into a specific but uncertain designation of the pronoun 'you' (Chun 2017: 3 and passim). In Charles Fillmore's example, you are a young woman who has been wolf-whistled in the street. You want to reprimand the whistler but it's not clear whether you are the intended target (it might have been some other young woman in the street), and 'to turn around and scowl is to acknowledge that you believe the message was intended for you, and that may be taken as presumptuous' (Fillmore 1997: 59). The uncertainty of reference applies both to the person who whistled and to the young woman, and in both

cases, we know the *kind* of person who fits the description, but not the particular instances that would fill those generic slots. In Althusser's version of this, a policeman calls out 'Hey, you there' in the street and I turn around, assuming he means me (Althusser 2001: 118). Both cases represent a situation of ambiguity in which I respond to the message by appropriating it to myself: I fill it with my desire to be the one hailed or whistled at, (mis)recognizing myself in the pronoun uttered by the other as though it were personally addressed to me. Although Althusser's account is problematic, based as it is in a model of subjection to and by a sovereign power enacted through my response to the Absolute Subject—at once the State, the Father, and God—it nevertheless gets nicely at the mechanisms of imaginary singularization and personalization through which recommendation systems and targeted online advertising operate.

In algorithmic recommendation systems such as those used on music streaming platforms, the particularized musical identity of the addressee is constructed from the continuous collection and aggregation of contextual data points. Content filtering systems like Pandora organize music by analysis of its structural features and continuously revise their weightings as they match them with feedback from listeners, without regard to genre labels, cultural mapping, or demographic position. A collaborative filtering system like Spotify, by way of its The Echo Nest subsidiary, takes this a step further by combining the outcomes generated by acoustic analysis software with 'semantic analysis of online conversations about music that take place every day, all over the world—millions of blog posts, music reviews, tweets and social media discussions' (Prey 2018: 1090-1). Overlaying on these analyses a preference analytics that captures[3] and records in real time a listener's musical behaviour and preferences,[4] Spotify treats the cultural mapping of music as a further insight, differentiating music that is structurally similar in accordance with the highly differentiated taste cultures of the digital world. The 'paradigmatic claim' of such algorithms is 'to specify the individual in the

[3] Seaver (2019) theorizes recommendation systems precisely as traps.

[4] Cohen (2019: 173-4) notes that 'Preference isn't about identity. It's about ranking, which is why it's so useful to the personalization industry – it tends not toward identification, disidentification, or judgment but toward measurement and quantification, which then come to inflect subsequent scenes of (dis)identification and judgment'.

complex conjugated personalized address: 'People like you like things like this' (Lury and Day 2019: 24). What these and other recommendations systems, like those of Netflix or Amazon, have in common is their generation of a 'you' that is not based on fixed markers of identity, either demographic (class, gender, age, ethnicity, and so on) or generic (jazz fan, Christian rock fan), the properties of which are presumed to be known in advance. Rather, they generate personalized recommendations from categories that emerge from a process of recursive revision.

If in a formal sense the profiles and 'reputations' constructed for us and addressed to us by advertising and recommendation engines have no content other than the acts of recognition or misrecognition—of imaginary personhood—that transiently fill them, it is nevertheless the case that these shifters are constantly being specified contextually through acts of rigid designation that seek to tie them to a name and a legally established identity (and that are just as constantly resisted by acts of counter-naming or heteronymy or masking). In practice this means the construction of data-shaped personal selves—data shadows or data doubles—across online databases, where information freely offered on social media as a referential truth (self-expression, life-writing, autobiographical timelines, and so on, however fictive these truths might be), or volunteered to state or corporate databases, or captured from phone usage and location tracking or from facial recognition systems, is fastened to a persistent identity by a kind of *point de capiton* pinning my online transactions and pathways to the official documents that are the baseline of my composite existence. The development of cookies and of even more persistent tracking IDs such as Flash cookies or web beacons has been at the heart of the ability of the state and corporations to silently monitor my activity in this more or less integrated way across convergent sites and devices. Although for many purposes on the Web it doesn't matter whether anyone knows you're a dog, and much information harvesting and analysis is concerned not with 'the personal identity of the embodied individual but rather the actuarial or categorical profile of the collective' (Hier 2003, cited in Cheney-Lippold 2011: 177), these tracking and fastening devices nevertheless allow in principle for the attachment of a corpus of data to my name, and of my name, together with the descriptive attributes it brings with it, to my embodied self. Stalder (2010: np) distinguishes three types

of profiles, which together create a comprehensive profile of each user: 'First, users are tracked as "knowledge beings" and, in a second step, as "social beings," exploiting their real identities, contacts, and interaction with those contacts. A final data set captures the users as physical beings in real space'. We might think by analogy of the legal identification of criminal culpability by means of documentary evidence such as eyewitness testimony or forensic analysis, where the indexical tie to the body of the culprit is established by a witness's sworn statement that they have seen this person's body or by the traces the body leaves at the scene of the crime: here too there is nothing but data, nothing that we can call simply a truth; but the verdict, the truth-saying, of culpability is given by the accumulation of those traces of information.

The person addressed by the second-person pronoun or implied by deictic markers or captured by stateful trackers is not a substantial particular, a self-identical presence, but the occupant of a semantic place; the space and time for which he or she serves as a reference point are constructed in dense networks of metaphor, and the body that orients that person in space and time is imagined and positioned through these networks. Since the place of the shifter may be occupied by anyone who is addressed by it, the 'you' is structurally riven, positional and alienable yet embodied, a reference point in time and space and yet movable from discursive point to point, a figure in a statement (Frow 2014: 164). Yet is this shifting 'you' not grounded in a material and experiential reality that *occupies* the pronoun and that we experience as the solidity of a selfhood? In one sense, it quite clearly is. My body can be arrested and thrown in prison; it can be tortured or killed. I can be enticed to spend money that I have earned by virtue of real physical or intellectual labour; I can go into debt and undergo material hardship when I lose my credit rating or my right to work. We could, therefore, posit the self of experience, as William James or Alfred Schutz do, as taking place in a field of deictic reference encircled by the body and mobilized in my face-to-face interactions with others, and then grant that everyday experiential self priority over the more remote modes of selfhood engaged in the worlds of secondary representations. We could, that is to say, posit a necessary gap between my embodied everyday self and my data self, my data double, my data shadow; between the 'I' that I live from the inside and the 'you' that is

directed to me from without or the 'he' or 'she' that describes me in a database.

Yet thinking about the relation between real and algorithmic personhood in this dichotomous way is, I think, both conceptually and politically unhelpful. It posits, in the first instance, a body that is distinct from the information that shapes it. As Irma van der Ploeg has argued across a series of papers, the increasingly prevalent translation of aspects of our bodies into digital code is not a matter of changed representations, with 'the thing itself' remaining the same (van der Ploeg 2012: 178), but a fundamental change at the level of ontology, since 'there is no clear point where bodily matter first becomes information' (van der Ploeg 2003: 70). The body through which we apprehend ourselves and others may look like a ground truth, but that body is not a pre-discursive matter. It is information in its substance and its processes—in the DNA that composes it, in its homeostatic regulation of the endocrine, immune, and autonomic nervous systems—and in all of the systems (the regime of state security, the state welfare and schooling apparatus, the insurance industry, the taxation system, medical databases, regimes of visual representation) in which it is inscribed. Likewise, for the person who is and who understands themselves through their body, this is nonetheless a body experienced through a bodily imaginary, the effect of a 'system of exchange, identification and mimesis' in which I shape my sense of myself by way of a recognition and incorporation of the bodies of others (Gatens 1996: 31). It is through this imaginary body that my fundamental fantasies about who I am and how I engage with others are shaped.

In the same way, to think in terms of a dichotomy of digital and real personhood is to posit too stark a disjunction between representations of the self and an offline actual self. The digital subject—the vocative self of advertising, the data double of surveillance systems—is not an external representation but the constantly mutating effect of 'the practices through which one *becomes* data through interactions with numerous other actors and actants' (Ruppert 2011: 225). Taking issue with the concept of the data double, Koopman (2019: 170) argues that 'data has become a crucial part of the very terms by which we can conduct ourselves. We are our data. Therefore we are precisely not doubled by it'. Interaction with data, whether voluntary or involuntary, witting or unwitting, is integral to the

actuality of our selfhood. This is a matter of a pragmatic and contingent formation of digital personhood; the algorithmic subject is sustained by the interplay of systems of ubiquitous surveillance but also by the 'unique combinations of distributed transactional metrics that reveal who they are' (Ruppert 2012: 124). I become who I am through my engagements with the real and the digital worlds, and the difference between those realms is increasingly tenuous. This data self that I 'am', however, is never singular: we can't speak of digital selfhood as a consistent aggregated identity formed across databases, since different databases measure and construct different realities: a reality of consumer desire, a reality of cultural preferences, a reality of political convictions and actions, a reality of economic capacity, and so on. Against the impetus of the state, and perhaps our own habitual impulse, to reduce identity to a single point of reference, we can at most speak of a plurality of more or less convergent, more or less heterogeneous forms of personhood, none of which is an absolute ground.

These distinctions may look scholastic, but I think there are strong reasons for teasing them out. In the case of my initial example of identity theft I tried to demonstrate the futility of any appeal to a real and embodied self. What counts in practical—that is, in administrative—terms is not the body that I am but the forms of documentation that make me up and the way they fit together. Similarly, resistance to state or corporate surveillance can't be grounded in appeal to the fundamental and singular reality of my person but only in alternative ways of figuring myself and of challenging or ignoring the specific forms of figuring and naming that construct and address me. 'Figuring' here means both calculating and performing the form of the person, and it comprises the acts of recognition that construct me as 'an element in a classifying series' and thus as a governable subject. If we are to understand the new modes of personhood of an evolving world of information technologies and self-educating machines, we must understand the complexities of new systems of construction and extraction of value, the extending universe of ubiquitous surveillance, and the changing forms of address that situate me in this universe.

'We', I said: 'We must understand'. But what 'we' must understand is the slipperiness of these pronominal shifters and the way they construct

communities of understanding which are far from self-evident: who is this 'we', who is the 'me', and what's the status of the slide between them that I performed a few sentences ago; who is the 'you' I'm addressing in the now of this room, and in the non-time of this writing: you present and absent, 'you' singular and 'you' plural, and what kind of plurality does that singular become? 'We', whoever we are, must above all learn to be distrustful of the communities we invoke and of the 'you' that invokes us and with which, in this time of speaking and this non-time of writing, I address and invoke you now.

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13

Figuring Accompaniment: The Creation of Urban Spaciousness

AbdouMaliq Simone

Something Else Besides

At the height of urban India's initial stage of the pandemic, there was much attention to the figure of the desperate migrant setting off by foot, often thousands of kilometers from their home villages. Faced with the shutdown of factories operating on non-existent margins and the loss of accommodation as well as livelihood, there was little choice but to head toward settings where they could, as was the common refrain, "figure things out." Usually caught within the repetitive rhythms of 14-hour shifts with little disposable income to circulate beyond the itineraries of work to hostel to work, there were few opportunities for these workers to grasp the larger setting in which their labor was situated, even when they had resided in a particular city for years. Income was to be remitted elsewhere, as was the directionality of everyday communication, with distant parents, children, and lovers. The artefacts of cheap consumption were usually available at the factory gates.

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There were those who, for whatever reason, amid many, did not venture "home," who remained in the city, even as they were compelled to set off in random circuits in the search for temporary food and shelter. Unable to be stably absorbed into any economic function or provisioning mechanism, these workers wandered across a landscape of details—a sudden burst of arguments between street sellers desperate for a sale, the glittering of rust on an abandoned car in the late afternoon sun, the lines of flowing water from a cracked pipe. All of these details became roadmaps, pointers to take particular directions, and then the discovery of empty schoolyards where one could sleep or the back stairwell where things were half-discarded.

For those who had rarely exercised voice, this landscape of rampant detachment, of all of the ways in which people, buildings, and materials were not connected to each other, provided a tentative platform for their growing confidence to strike up conversations with various passers-by, offer outlandish propositions about money-making schemes, or most usually to comment upon some element of the other person that had imbued them with great significance. Without apparent commitments or attachments, without the luxury to compare themselves to others and refusing the obligation to always think of the others to whom they had been attached, these excursions revealed all varieties of spaces that didn't seem to be committed or attached to the uses they would seem to purport.

This was not only a matter of schools being turned into vast communal houses, markets into mathematics classrooms for orphaned teenagers, shrines into all night popular political assemblies, or government tax offices into repair shops for homemade inventions. Rather, they were all those spaces in the midst of things, within crowded thoroughfares, jetties, underpasses, hallways, and arenas that didn't quick fit with what was happening around them. Spaces ever so slightly out of joint, where the anomalous, the marginal, while clearly visible remained ever so slightly indetectable, enough for moments of rest, the rehearsing of some kind of weirdness, a base to build a modicum of confidence to venture forward or back. Instead of being preoccupied with figuring out what would become of them, what would be their final destination, these workers saw themselves like these spaces ever so slightly out of joint; saw themselves as *accompaniments* to the "normal" goings-on; saw themselves as neither

adding nor subtracting, rectifying, or disturbing, but as something else *besides* what was taking place.

What would happen if we viewed figuring as involving accompaniment, or as always also accompaniment; something that does not discernibly alter the visual and sensual dimensions of an event or entity, that remains apparently aloof from its configuration, but which nevertheless prompts a reorientation of view and engagement; which at least raises a degree of uncertainty about what it is we are confronting in an appearance that otherwise has all the hallmarks of an integrity and coherence. For all of the anxiety often demonstrated about securing definitive boundaries for self and other, for collective lives suffused with sufficient commonality to ensure reciprocal recognition and mutual obligations, accompaniment is permanently out of place, disinterested in whether that which is accompanied assumes a particular figure or not.

For, accompaniment means something that operates aside, on the side, that does not entail obligation, nor a manifestation of mutual desire. If I accompany someone, it does not mean that the person accompanied could not accomplish the task on their own. Someone can still perform the "solo" without missing something essential. Accompaniment is a supplement, that shows up, now and then, goes along for the ride. It is not unaffected by the going along, but it is not essentially invested in the outcome of the task at hand; it does not constitute a debt to which the recipient is owed, even though such a debt economy might ensue from a particular accompaniment.

We are accompanied by an array of "companions" throughout the urban environment. Rather than seeing the built environment as the stage through which to exercise our privileges, or as the concretization of aspirations, needs, and accomplishments, the built environment acts as an accompaniment to whatever we do. It pays attention to our practices; it bears witness to our travails and attainments. There is always something not used or only partially used, something that remains just out of reach, something barely noticeable or deemed irrelevant that accompanies all that is standard operating procedure, all that are demarcated, sectored, and zoned spatial arrangements. Accompaniment is a submergent infrastructure that suggests something else than what is recognized.

Figuring is often construed as a process of things "closing in on themselves," of accentuating the distinction between figure and ground through which the outlines of a stable entity might be construed; stable in the sense that we might come to know what to expect of it, that is rendered in a form recognizable through multiple iterations, that holds "its own" amid conflicting expectations. Figuring closing in on itself suggests the constitution of a target, something to take aim at, as it also embodies its own aims, and thus further suggests the primacy of straight lines, grids, and probabilities. The generalized conversion of the world into multiple targets, where specific populations are targeted for specific policies and probabilistic action, clearly has intensified the compression of space-time, as everything is reachable through less dense and circuitous mediations (Bishop 2018; Valayden 2016). The generalization of the commodity form and its elicitations and compressions of singular affect turn individuals into entire worlds and, at the same time, fracture them into infinitesimal pieces of codes, biomes, body parts, behaviors, and inclinations (Law 2015; MacKenzie 2016) . Just as the urban, for example, is populated by an exponential explosion of objects, data points, and niche markets, spaciousness is reduced, space closes in on itself.

Acknowledging the accompaniment of figuring is then a restitution of spaciousness, a sense of individuation, of contributing a sense of the improbable to worlds fading in their distinctiveness. As Stiegler (Stiegler 2018) reminds us, the continuous updating of the figure through its subjection to repeated runs of relational calculation, of figuring its constant re-positioning in terms of shifting relations to a constantly expanding set of "neighbors"—of things and events that might have relevance to its operations—produces a generalized blurring. This is a sense where it is not only difficult to figure things out by getting a hold of the figures that might be involved, but where figuration itself dissipates in the profusion of the technical. Rather than zeroing in with the precision of determining the definitive coding and composition of figures, accompaniment potentiates the spaciousness required for figuring to endure its availability to digital architectures and the concomitant simulations and fabrications that can ensue from algorithmic re-composition.

As Denise Ferreira da Silva (Ferreira da Silva 2018) demonstrates in her play of figuring, of subjecting the figures of patriarchy, femininity,

and racial identity to their own algebraic inversions, these figures can be decomposed in ways that enable a sense of incalculable spaciousness to emerge. If the figuring of specific bodies is based on contractual, juridical arrangements—the terms of recognition, rights, responsibilities, and value—then potentialities of what exists are appropriable only through extraction, and thus the exercise of violence. The figuring of the juridical-ethical edifice of the properly human figure takes place as propriety through property; in other words, through the proper management of property that is fundamentally unruly, and in need of management. Black life as property, thus, has existed as that fundamentally unruly, chaotic potentiality that needs to be properly managed so that its resource can be extracted and deployed. This potentiality is subject to contract, to a particular set of equations where specific figures embody specific rights of management and sets of obligations. The ability to manage property becomes then the exercise of liberty. What da Silva attempts is a mathematics extricated from contractual relation that frees the figuration of the calculable to incomputable potentialities, imbuing a sense of spaciousness to the process of figuring.

Even within the confines of the contractual relationships which defined the black body as a captured object on which the infliction of violence was necessary in order to bring its potentialities to life, the subsequent deformation of the figuration of gender, its reduction to the amorphousness of flesh, posited possibilities of extensionality of and among bodies that both portends the fungibility of human life yet, at the same time, potentiates other more uncertain formulations of bodies not easily decipherable according to the convention terms of liveliness and scale. For across traditions of American black thought, the sense of accompaniment has been an omnipresent characteristic of everyday life. Rather than viewing the relationships of bodies, land, animals, plants, and other materials as part of an integral ecology or integrated metabolism, there was rather the sense of these things accompanying each other, passing through and among each other; where each could be "called upon" as some available exteriority to lend a hand, to get through a particular conundrum (King 2019; McKittrick 2006; Wynter 2003). Each had its autonomy, its situatedness in other worlds, but at the same time was always on hand, even though what exactly was called upon was often never clear, rarely assumed

the figuration of a divine force or a specific identity, but even so, whose presence could be recognized. Across the manifestations of "long walks to freedom," to cellphone recordings of police violence, to the multitude of minor refusals to being pinned down in the incarceration to proper relations, black lives have accompanied each other in the ebbs and flows of a collective figuration that does not consent to any particular set of recognitions.

In a not dissimilar fashion, Dhanveer Brar (Brar 2021) encourages thought on an ecology of black generativity and constraint far beyond the "caricatured landscapes of post-apocalyptic urbanism." Grasping the mineral interiors of three instantiations of black electronic music and their embodied sensory intelligence and antagonisms, he focuses on the way in which music operationalizes specific capacities to navigate and refigure the confluence of racialized precarity and enduring capacities to create life beyond the normative vernaculars. Chicago, Detroit, and London are rendered as transversal, oscillating planes of urbanity curating and dispersing sounds, propositions and maneuvers, which not only take blackness to the world, but create an experimental world from blackness that reverberates within the midst of unequivocal oppression, providing an enhanced spaciousness. He calls attention to the ways then that urban residents are living in contexts that both exceed the figures through which we understand them yet which penetrate our very core as metabolism, infection, and vibration. Not simply reducible to spirits of resistance, resilience, or reserves of long-honed creative practice, the navigational instruments operationalized through black music are instead the concerted deployment of machines, reinventions of sonic architectures, as well as the deliberate and systematic workings of bodily and cognitive capacities, whose figurings are less the production of image but force.

Urban Gathering and Arrangements

In *Surat l-isra*, Allah says, *"If mankind and the djinn gathered in order to produce the like of this Qur'an, they could not produce the like of it, even if they were to each other assistants."* While pointing to a gathering beyond

any specific gathering as that which produces the Quran, implicitly this surah raises the question of what kind of gathering could that be among humans and djinns[1], with humans representing a particular consciousness and djinns perhaps embodying what could be called a "worldly sensibility" excessive of the registers of that consciousness.

In this accompaniment of djinn to human, gathering here is a conjunction of actions rather than the cultivation of a higher, interior consciousness. In bringing together the manifestations of distinct forms of sensing, not readily compatible, not readily translatable each to the other, there is a gathering that does not merge, does not integrate. It draws our attention to the ways in which complex urban environments are sensate agencies in and of themselves, even if such environments may not be clearly organized into a series of readily identifiable entities, machines, or agencies. It draws our attention then to the kinds of capacities and sensibilities embodied by particular environments and the use they make of and draw from particular forms of inhabitation and populations of inhabitants—both human and djinn.

This points to a critical question today: How do residents largely unanchored from their long-honed stabilities observe the situations that require from them new ways of seeing, new dispositions of circumnavigation? How do they attempt to reconcile their "blind spots," to read themselves into the surrounds, into a background that senses their existence in ways inaccessible to them? How do they compose points of views, angles onto things capable of observing prospective trajectories across time and space—where observation is a process of composition that requires gathering up potential collaborators differentially distributed across personal networks and territories of operation?

To use Day and Lury's (Day and Lury 2014) term, how do residents *render*, gather up, and turn over or turn out particular visualizations of their urban contexts and urban problems? Particularly in ways that publicize knowing when they do not know, and not knowing when they do, so that their liveliness is not fully captured by the particular and

[1] A species of invisible beings created by fire frequently referred to in the Quran that proceed the existence of human beings. They are viewed as an integral accompaniment to human existence, a supplement at times generative or destructive. Djinns are frequently viewed as the essential nonhuman guarantor of human creativity and fallibility.

oscillating expectations of capitalist surveillance. With so many factors at different scales at work in rendering places knowable and subject to multiple interventions; with so many alternating interplays of shadow and light, how do residents of volatile, ever-shifting urban terrains garner a sense about how to move, what to do next?

So when I say that *djinn* might represent the accompaniment of a worldly sensibility to human will, I point to a sensibility that implicates a body or agent (as a unity of experience) in ways that exceed capture of, to or by any definitive institution. Mediated social-technical circuits are not subsumed to the intentionality of any one agent. Our agency, rather, is implicated through and by these circuits. This is an enactment of agency not bifurcated in terms of self and other, human and more-than-human. It is a mode of engagement with an environment not directed by conscious intention, but rather an intersecting of multiple operations. A body recursively incorporates the feelings generated by immersion in crisscrossing data streams into specific embodiments of observation, of attending to the surrounds that exceed the conventional vehicles of sensing or its distribution into the perceptible and imperceptible (Massumi 2017). This is what happens when human and djinn work together.

For our shaping, an enduring performance for the world always must operate through that which cannot be seen, and increasingly the deployments of information environments for purposes of surveillance and domestication make it urgent for there to be bodily operations that might remain imperceptible, under the radar (Citton 2017). As such, the rhythms of endurance are not about the resilience of human life, about the never-ending resourcefulness of a subaltern imagination. It is not about a virtuous general ecology that, in the end, works out a functional recalibration of elements each diminished in their own terms, each insufficient to the replenishment of the other. Rather, endurance also entails the actions of bodies indifferent to their own coherence, where bodies churn and stave off death in their extension toward a liveliness of things in general, and where bodies become a transversal technology, as gesture, sex, gathering, and circulation operate as techniques of prolonging (Wills 2016).

What is it that a person pays attention to in a world where so many things can be attended to; how does one create a spaciousness of

operation when life can theoretically be moved and oriented in so many different directions. Here the notion of *arrangements* becomes critically important. Unlike the predominant use of *assemblage* to connote the intricate compositions of materials, events, forces, and entities that constitute the salient figure of subjectivity, particularly for urban operations, *arrangement* seems to decline the primacy of attention to composition and rather amplify acts of *accompaniment.* As normative protocols of relations remain largely tied to the contractual, to familial forms of obligation, or to the affective intensities of libidinal attachments and the reciprocities of friendships, arrangements, while folding in bits and pieces of conventional contextual categories and relational processes are not subsumed by any of them. In a reflection on the ways in which symbiosis and parasitism characterize relationalities of the biome and viral as metaphorical substrates of the human, Chun-Mei Chung (Chung 2020) points to arrangements as those "intelligence operations and complex linkages that are concealed, dark, secret, and challenging to see, rewriting internal and external boundaries." While not precisely mapping onto the kinds of urban arrangements I invoke here, Chung, nevertheless, points to the ways in which arrangements straddle uncertain lines between the generative and debilitative, that do not announce themselves transparently as having particular objectives in mind, and which are not clearly mappable in terms of their reach or even in terms of what they do.

This is not to say that genealogies of arrangements are impossible to conduct. For years I have attempted to examine the ways in which production systems that entail vast subcontracting across hundreds of home-based workshops generate large volumes of clothing and hardware. These are certainly arrangements structured by brokerage, monopolistic control of supply and distribution chains, and exploitative pricing systems abetted by skewed regulatory frameworks. But the process of securing the stability of these arrangements, making sure every actor and component adheres to the specified transactions, also seems to entail a process of sporadic and largely indecipherable lateral relations, where workshops elaborate their own largely provisional distribution networks for off-the-grid productions, and where it is not clear who is in charge, nor how the operation in its entirety actually works. For here, little is consistent; sometimes things work, sometimes they don't. This temporality of the

maybe suggests not necessarily a deficit of integration, but a stuttering, a process amenable to interruption and detour, where the different workshops, their workers, the brokers, the stalls in the market where the "illicit" output is eventually sold, and the wildly fluctuating tastes of the usual consumers *accompany* each other with a looseness that suggest fortuity and chance rather than strategic planning.

In a large night market across multiple streets in Kebayoran Lama (Jakarta) that supplies meat and fresh produce to the hundreds of small local markets across the region, the daily functioning requires a well-orchestrated choreography of directing supply trucks into the market area, unloading the trucks and distributing the goods, of retrieving and setting up tables on which the produce will be displayed, of shifting goods around to meet the needs of regular customers, of extracting various market fees in which to pay off various local officials and police as the operations of the market are officially unsanctioned, and then of dismantling everything and cleaning a large swathe of otherwise public space—for by 8 a.m. there is absolutely no trace that this market even existed. Clearly all of the functions have to be interconnected, arranged, but on any given night those who were porters become sellers, drivers become cleaners, sellers become fee collectors, and so forth in a system that remains unspecified, reliant upon unforeseen initiatives that shift the division of labor around. The plausibility of these shifts are of course anchored in the eventual capacity of everyone involved to do every conceivable job, but there is no underlying reason why this has to be the case, or when it becomes the case. Each actor and function simply appears to accompany the other, both symbiotically but also with a fundamental looseness that detracts from the need for a coherent figuring of the organization of the market. Rather, the market seems held together on the basis of how easily it could fall apart.

Indeed, arrangements sometimes become visible only as they shift over time, when their *stagecraft* becomes apparent, in the taking to the stage of specific constellations of assessment, brokerage, mutual attentiveness, provisional rules, and collaborative practice. For example, when the implicit governance systems of migrant hostels, no longer articulated to the subsidies and salaries paid out by formal employers, have to shift to new arrangements of resources, social connections, livelihoods, and social

identities. Place-based arrangements may be converted to more transversal collaborations; the application of specific lenses of institutional readings of given contexts may necessitate readjustments in the ways in which resources are allocated and adjudicated. Household functions may be redistributed across multiple locations, where a single address serves more the pragmatic function of having an address than representing a coherent household unit. Each re-arrangement has its own subjective condition, which lasts as long as it works, and where how long it works depends upon who is paying attention, in what ways, and for what reasons. Particularly during the pandemic year of 2020, when a slew of restrictions were placed on public mobility and the pursuit of everyday livelihoods, it became evident the extent to which the appearance of predominant forms of social organization were simply a veneer of rationalities that had little traction in the actual ways in which residents organized places to sleep, procedures for attaining and allocating available resources, and tacit rules for the use and distribution of space in ways that continuously contested clear divisions between the proprietary and non-proprietary.

Officially localities might be the conjunctions of formal households, property, zones, discrete institutional competencies, and authority relations, but when faced with exceptional conditions, they were then visualized not just as compensating for these conditions with special arrangements of all kinds, but simply extending, recalibrating, or improvising upon a social economy of off-the-grid arrangements that had already existed over time. While it is certainly possible to elaborate a symbiotic relationship between that official veneer and the plurality of makeshift arrangements that could be seen as underwriting them, it is more a matter of viewing them as mutual accompaniments, only loosely sutured in ways difficult to calculate. For in most respects, drawing upon Harootunian (Harootunian 2000), such arrangements are unremarkable, embodying little subjective depth and rather existing as a series of horizontal displacements, where one concrete manifestation does not clearly translate into any other.

Additionally, a sense of spaciousness can be produced through acts of refusal, of keeping things apart rather than putting things together. Instead of querying puzzles as pieces that must inevitably fit, there are

relationalities that may maintain a sense of proximity among processes and problematics that are not necessarily resolvable through integration or synthesis. For example, if specific libidinal attachments remain salient in relationships to family, household, community, and state, what happens to libidinal economies as particular roles and responsibilities are refused. Rather than indicating social breakdown or disintegration, what happens when detachment simply signals a tacit refusal to "tie up" one's desires into the expected formats. For example, what happens to the desires for familial affection when fathers refuse to attach themselves to the purportedly normative behaviors that constitute fatherhood; what happens when women concretely manifest indifference to the presence of men as an integral aspect of household composition? What happens when the role of "worker" no longer provides a valorized basis through which individuals identify themselves and their worth? What happens when localities refuse to reflect compliance to the prevailing standards of viability? How and to what extent are familiar obligations recalibrated in new terms or simply refused altogether? What kinds of arrangements mark a detachment from the normative tropes of socialization? Here arrangements as matrices of accompaniments do not so much constitute new coherent figures as they work through and around the vestiges of those no longer operative in the ways originally intended. Rather they function as ciphers marking a series of detachments that keep each element in view but without settling into stable forms of clearly delineated features or responsibilities.

Figuring the Extensions

The urban has long ceased coinciding with the figure of the city. If by the city we mean a densification of agglomerations among materials and bodies expressing distinct locational advantages, territorialization of accumulation, and the rise of intensely individuated performances of citizenship and self-fashioning. The city-form is a mode of reflexivity capable of territorially binding the intensities of relations to a coherent synthetic operation based on the integration of differentiation—that is, work detached from the primacy of household-centered economies,

re-socialized as industrial labor, continuously elaborated through networks of servicing and management, abstracted as elements of financialized calculation, and availed increasingly individuated opportunities of consumption and social identification.

If the figure of the city disappears, or at least is partially dissipated in the extension of urbanization processes across more pluralized dispositions, through peripheries, hinterlands, corridors, conurbations, and regions, are there appropriate figures capable of marking, cohering, or imagining this process. The typical conventions have been those of volume, such as the "megacity" indicating exponential expansion, or that of a supplement, such as "urban region" as the city plus something else. "Urban periphery" has long been invoked as a way of marking a transitional or liminal space, as that which awaits the city's "arrival," or as a modality which transfers the city across space, the very means of its extensionality. Most contemporary theorization of these extensions, however, marks a disjuncture with the figure of the city and views their spatial histories as reflecting more dispersed, erratic, and polyvalent articulations (Keil 2018; Lefebvre 2014; Monte-Mór 2014; Schmid et al. 2018).

It is not a matter of extending the city into new territory but in the simultaneous intercalibration of very different logics of settlement and production, an interweaving of divergent tenure regimes, land uses, and modes of inhabitation that instead of settling into distinct patterns of agglomeration and inter-connectedness are continuously disturbed and re-oriented through additional spatial products and development initiatives. Here, the intensive contiguities among industrial estates, peasant farming, upscale mega-housing developments, the voluminous rollout of cheap pavilion housing, expansions of informal settlement, premium logistical infrastructure, and feral landscapes resist any clear governmental integration despite intricate spatial planning. Projects come and go, often with wildly diverse temporalities and efficacy; ongoing development is not a matter of whether past projects have proved viable or not as they are informed primarily by a sense of *eventuality*—that is, eventually whatever is developed will acquire some profitability even if the terms for that are not presently available. As such, it doesn't matter the extent to which industrial zones, housing developments, and commercial estates may remain half-empty, for the addition of more spatial products is seen

as engendering a new context for what already exists, in a constant repositioning of the built environment into something else that may then prove key to a renewed sense of viability.

In Jakarta's massively expanding urban region, emerging metropolitan areas such as Cikarang embody intensive mixtures of logistical apparatuses—internal ports, high-speed and light rail systems, new freeways and air cargo ports—new town developments, such as the present construction of 250,000 apartment units, six universities, ten hospitals at Meikarta, and an array of tens of thousands of migrant hostels, low-end housing and mid-level commercial zones spread across the metro. All of this is set as yet another iteration of residential and industrial development that has been underway for the past four decades. The subsequent diversity of layering and sedimentation that takes place intersects obdurate economic functions that co-exist with land uses and projects that have changed repeatedly over short time spans. While developments may be spearheaded by the combination of major landholders transitioning into major regional politicians, aided and abetted by the profusion of a new generation of small-time brokers, and Indonesia's major real estate developments and financial institutions, the political and technical power brought to bear is unable to cohere these extensions within the conventional planning tools or protocols of speculation (Firman and Zul 2017; Herlambang et al. 2019; Shatkin 2019). Rather than work as a series of coherent synergistic or multiplier effects, the discrepant elements seem to simply accompany each other, all exerting some kind of influence in a semi-detached state, but without a clear sense of proportions involved.

For what might be considered subaltern actors in this region, there seems to be a strong reluctance to contribute to any coherent figuring of what is taking place, and rather an investment in capacitating the very looseness of relations among the discrepant elements of the built environment and the different logics of accumulation at work. Along the raised embankment of an irrigation canal that now separates corporately held agricultural land from the almost magical appearance of Meikarta, residents originally from the island of Madura, across from Surabaya, have long operated from hundreds of makeshift compounds, with their various assortments of junk, found and stolen items, including steel beams, bags of concrete, broken door frames, thousands of bolts and screws

dismantled from who knows how many infrastructure projects. Renowned as artisans of the "useless" and providers of what anyone needs for almost any kind of project, the Madurese are the consummate archivists, rarely discarding anything, and talking about and arranging their "wares" in such a way as to propose interconnections among things that might often seem outlandish and impossible but nevertheless of potential value to an audience that seems to take many of these propositions sufficiently seriously to maintain these archivists in business. A row of cheap migrant hostels, for example, abandoned because of internecine conflict or simply bad positioning in face of flood drainage, can be completely dismantled in a matter of hours and the components reinserted in wide range of repairs, house extensions, junk markets, and small factories before the day is over.

The Madurese are not only collectors of materiality but also cheap jobs as well. They won't usually do the jobs themselves because it impinges upon their sense of freedom, but collect them to be distributed to others—for example, particularly porters, janitors, cleaner, and security guards. The objective is not so much job-*placement* per se, but brokering connections among different jobs as part of an expansive information network, which circulates updates about what is taking place across different factories, construction jobs, internal customs ports, and service centers. Such a network not only facilitates the "just off the truck" acquisitions of materials or the ability to offer "quick solutions"—material inputs—to projects or operations facing unanticipated problems, but concretizes "off grid" relations among places and functions, that is, those that do not fit into any of the prevailing conceptions about how things and places are to be connected to each other.

This positing and materializing of "off grid" relations is not conducted within the register of realizing unexpected potentialities. It doesn't concern itself with developing alternative worlds or inventive usages. Rather, it functions as intensive artificiality, even noise; a means of interrelating things not informed by a specific vision or even objective. It concerns an infusion of incomputable instrumentality in the intersection of the quotidian experiences of hundreds of "service" workers and laborers across a landscape characterized by moving things around, constantly

improvising where they might fit, disrupt, and supplement operations of almost any kind.

The Madurese are constantly on the run. Even within their internal dealings along this irrigation canal, it is unclear what relationships one makeshift compound has with any other, or whether any "project" is simply the result of individual brokerage or some kind of intricate collective choreography among them. It is not clear whether or not a tacit moral economy of sharing markets, a complementing of distinct networks, or a fortuitous interweaving of competition is at work. What is evident is a very loose sense of any affiliation with *property.* Madurese are stereotypically known as thieves with almost extraordinary powers and agility, as well as being indiscriminate in terms of weighing the relative value of whatever they can get their hands on. Nothing is deemed either waste or luxury, even as they are known for driving a hard bargain around anything they attempt to get rid of. They certainly know the market price and how to set it. But any sense of *propriety with property* is far removed from daily operations that attempt to draw lines across the "backdoors" of nearly everything that exists in this area.

In amplifying the essential brokenness of the world, of things out of their *proper* place, no matter where they end up or how they are used, this economy goes beyond reparation to highlight how that brokenness suggests its own propositions devoid of the will to restore functionality. The Madurese, known for breaking the integrity of projects, repurpose elements from that brokenness to dispositions that they have little interest in defining, but rather seek to perpetuate a state of brokenness as generative of a continuous circulation of materials across different hands, different sites, and different uses.

Here, relations are proposed that are detached from obvious genealogy, that compress things conventionally viewed as impossible to be together, and that have no way of knowing whether they will endure or not. This techno-poetics of relationality implicitly addresses the fundamentals of urbanization itself, that is, as a process simultaneously human and inhuman; that does not proceed simply as an artifice of human will, but as a *techne* both with and *without* its own registers and affects (Simondon 2009; Simondon 2017). In other words, the *technical* dimensions of the relationalities of urbanization come from all over the place, and work in

different degrees, proportions, and manifestations that come to be associated with it but also do not intrinsically belong to it. This is because there is no essential overarching figuration attributable to urbanization outside of its profusion of technical relationalities—its capacity to continuously repeat everything we might know about it, and upend itself at the same time.

Concluding the Surrounds

In the clamor of countervailing projects and logics at work in generating contemporary urban inhabitation and operation, what constitutes viable modes of figuring able to navigate the intricate physical and social landscapes of discrepant times and strange spatial juxtapositions? Instead of envisioning processes of urbanization as the unfolding of definitive forces of value capture, asset creation, and resource extraction, how are these albeit salient categorizations of spatial production accompanied by a growing multiplicity of entities and their exertions? Particularly at the extensions, just beyond what has customarily been purported to be "the real city," it is increasingly evident that a continuous recalibration of "projects," material inputs and residues, and altered ecologies of reciprocal causation are generating landscapes that exceed the salience of available vernaculars of analysis and intervention. Here, intricate landscapes of provisional sutures, half-lives, diffractions, disjuncture, compensation, and transience create unsettled urbanities and populations.

Here there is a play on the interrelationship between figure and (back) ground, even as this couplet is incessantly reproduced. On the one hand, it is clear what is taking place in these extensions of the urban, replete as they are with now easily recognized spatial products. We seem to know where they are going, even when it is likely they may never reach their "destination." They hold forth a seemingly contradictory *promise*—that of a capacity to encompass greater numbers of persons into the predominant tropes of urban productivity; providing assets and opportunities, and enhanced logistical proficiencies; and a capacity for any particular instantiation of the built environment to be more than it appears to be. To be constantly fungible, re-doable, and where everything is eventually

useful to someone. In this mix of standardization and singularity, figure and ground are constantly being reversed in order to accommodate the duality of this promise. To *stand by this promise* is not to adhere to its specific figuration but rather to the possibility of a figuring that eventually emerges from a background that cannot be mapped but to which one might be exposed.

For as many of the inhabitants of these extended urban regions I have talked with now frequently point out, it is important to pay attention to the background. For them, the background combines a willingness to suspend the judgment that what you see is what things are, an acknowledgment that beyond the immediacy of a person's context that there is a field of vision that can be grasped and composed in excess of what is presented, and a belief that this willingness to see in a different way, a way that does not tie everything together into a coherent image, will enable the person to better navigate the ins and outs of everyday urban life. These processes of willingness, acknowledgment, and belief are then often crystalized into a particular working image and constitute a promise.

Thus, while dedicated genealogies may be capable of grasping how particular built environments, spatial dispositions, and fabric got to be the way they manifest themselves, there is something that eludes coherent narratives of development and prospective futures. These are spaces of intensive contiguity of the disparate—disparate forms, functions, and ways of doing things. They are replete with gaps, interstices, breakdowns, contested territories, and sediments of dissonant tenure regimes, financing, legalities, and use. Instead of being able to discern legible articulations among the details of composition, the proliferation of housing, commercial, industrial, logistical, recreational, entrepreneurial, and governmental projects are less subsumed into overarching logics of capital accumulation or neoliberal rationalities as they are "strange accompaniments" to each other, where nothing quite fits according to design, where things dissipate or endure without obvious reason, and where improvised alliances of use and rule continuously reshape what it is possible for any particular individual or institutional actor to do.

I call this mode of accompaniment, of not clearly discernible or translatable territories of operation, *the surrounds.* The surrounds constitute neither an explanatory context, nor relations of interdependency. They

are not strictly geographical phenomenon nor temporal, but can alternate to varying degrees. The surrounds do not surround a given space, project, environment, or ecology as a boundary-limit or some constitutive outside. They are not some alternate reality just over there, just beyond the tracks, or the near horizon. Sometimes they are heterotopic, exceptional, intensely specific, hidden in plain sight, prefigurative, or dissolute. In all instances the surrounds are infrastructural in that they entail the possibilities within any event, situation, setting or project for something incomputable, unanticipated to take (its) place. While such surrounds have always existed within cities, the urban extensions amplify the ways in which they exert both a structuring effect in the rapid coverage of land with multiple projects *and* a by-product of the tensions and countervailing logics at work in the very construction and composition of these extensions.

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