The Machinic Imaginary: A Post-Phenomenological Examination of Computational Society

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Thesis for the degree of Doctor of Philosophy submitted to the department of Media, Communications and Cultural Studies, Goldsmiths, University of London

March 2023

Declaration

I declare the following thesis to be my own work. Where the works of others is used, they are cited and referenced in the bibliography. Any assistance from others is listed in the acknowledgements.

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Acknowledgements

This work is not mine alone, it is the culmination of the shared experience of all those with whom I have lived this experience of writing a PhD thesis over the years. Every one of the following has left traces that linger in and between the words contained below. This thesis was made possible thanks to their emotional support and intellectual generosity. More than simply the condition of possibility of this project, this thesis is a documentation of their presence in the lived experience of its writing.

My supervisors: Luciana Parisi, whose MA module 'Critical Theory: Interactive Media' at the Centre for Cultural Studies opened my mind to a whole new world of ideas, and whose work was the initial inspiration for this thesis, thank you for believing in me and taking me on as a student. Marina Vishmidt, for supporting me through the upgrade. Matthew Fuller for taking on this project in the finishing stretch, without whom I am unsure I would have finished, thank you for your commitment, patience, and insightful ideas.

Lynne, my philosophical friend and companion. This would have been impossible without your never-wavering loving support and encouragement, thank you for letting me ramble on about my wild ideas and for pushing me to not give up. Fabi, whose arrival into the world spurred me on to finish this thesis before he was born. My family: my mum—the first Dr Moriarty—who has always believed in me, my dad and Mel, Helene and Brian, my grandparents, Maêv for her caring presence and constant silliness, and Noah and Chica, whose own philosophical journeys have been an inspiration, Frank whose own PhD journey gave me a timeline to beat: thank you all for your loving presence and encouragement.

All the St. Jimmies CCSer's, especially: James Philips and Hayato Takahashi, collators, interlocutors and all-round supportive friends, with whom the creation of concepts is always free and wild. Nicole Sansone, one the best writers I know, and all-round motivator—the reason I finished in time was that arbitrary deadline she gave me. Ramon Amaro, friend and mentor, always pushing me to beyond my limits, and providing so many opportunities along the way. Mijke van der Drift, Vincent Moystad, Neda Genova, Zhenia Vasiliev and everyone else who worked in that office.

Plus the countless other people who I have encountered, in academia and beyond. All my teachers along the way, including all the students I have the privilege to teach and learn with over the past five years.

Abstract

The central claim of this thesis is the postulation of *a machinic dimension of the social imaginary*—a more-than-human process of creative expression of the social world. With the development of machine learning and the sociality of interactive media, computational logics have a creative capacity to produce meaning of a radically machinic order. Through an analysis of computational functions and infrastructures ranging from artificial neural networks to large-scale machine ecologies, the institution of computational logics into the social imaginary is nothing less than a reordering of the conditions of social-historical creation.

Responding to dominant technopolitical propositions concerning digital culture, this thesis proposes a critical development of Cornelius Castoriadis' philosophy of the social imaginary. To do so, a post-phenomenological framework is constructed by tracing a trajectory from Maurice Merleau-Ponty's late ontological turn, through to the process-relational philosophies of Gilbert Simondon and Castoriadis. Introducing the concept of the machinic imaginary, the thesis maps the extent to which the dynamic, interactive paradigm of twenty-first century computation is changing how meaning is socially instituted in ways incomprehensible to human sense. As social imaginary significations are increasingly created and carried by machines, the articulation of the social diverges into human and non-human worlds. This inaccessibility of the machinic imaginary is a core problematic raised by this thesis, indicating a fragmentation of the social imaginary and a novel form of existential alienation. Any political theorisation of the contemporary social condition must therefore work within this alienation and engage with the transsubjective character of social-historical creation.

Introduction

This thesis is an exploration of the ingression of the computational into the social imaginary. It aims to map the ways in which the dynamic, interactive paradigm of twenty-first century computation is changing the way meaning is socially instituted.[1] Put differently, this thesis is a study of the "social imaginary significations" (Castoriadis) that establish the conditions of possibility for action and abstraction in computational society.[2] The central thesis is the postulation of *a machinic dimension of the social imaginary*—a more-than-human creative expression of the social world. This thesis is premised on the idea, advanced by Luciana Parisi, that the historical development of computational abstraction marks the emergence of a mode of being-in-the-world that is more-than-human, which I call the 'machinic imaginary'.[3]

It will be argued that, with the introduction of learning into computing and the sociality of interactive media, computational logics have a creative capacity to produce meaning of a radically machinic order in society.[4] This argument will be articulated though a post-phenomenological analysis of computational functions, techniques, and applications, ranging from artificial neural networks (ANNs) and other machine learning approaches, to "large-scale machine ecologies".[5] A further tableau of examples are also considered to explore the interactive dynamics of these machinic processes with the human-social world. Through this analysis I demonstrate how the institution of computational logics into the social imaginary is nothing less than a reordering of the transsubjective conditions of social-historical creation.

Methodologically, this thesis develops a speculative, *post-phenomenological* approach. The new method of post-phenomenology proposed in this study expands the phenomenological notions of 'meaning' and 'world' beyond the confines of the traditional phenomenological explanation of transcendental subjectivity, as found in Edmund Husserl. This broadening seeks to locate the creation of social meaning in computational processes without resorting to grounding meaning in human-biological experience, as happens in the phenomenology of technology of Bernard Stiegler, Yuk Hui, Mark Hansen, and others. This is done by addressing the *transsubjective* character of meaning created and carried by the social imaginary, which exceeds the limitations of the classical phenomenological method. It will be argued that this post-phenomenological trajectory of thought can be constructed by tracing an arc from the late ontological turn of Maurice Merleau-Ponty, though to the process-relational philosophies of Gilbert Simondon and

[1] Goldin, Smolka, & Wegner, 2006.
[2] Castoriadis, 1987.
[3] Parisi, 2015. A different but comparable argument that has also influenced my thinking on this subject can be found in: Negarestani, 2018.
[4] Fazi, 2018.
[5] Neil, *et al.* 2013.

Cornelius Castoriadis. Encountering the computational through a post-phenomenological framework raises a new set of problematics that require further evolution of that same post-phenomenological framework. Thus, through its application, post-phenomenology can be further defined and refined, while at the same time unfolding the implications of the thesis of the machinic imaginary.

One such problematic is the question of a praxis of reflective articulation of the social imaginary world. In light of the notion of the machinic imaginary, this thesis both updates and problematises Cornelius Castoriadis' philosophy of the social imaginary. Castoriadis proposes a renewed notion of *praxis* that converges action and abstraction (doing/thinking) into the creativity of the social imaginary. However, this thesis interrogates whether such a notion of praxis remains a possibility in the face of large-scale efforts to automate all areas of action and abstraction in contemporary computational society. If the machinic imaginary is, by definition, incomprehensible to humans, Castoriadis' theory of an autonomous society able to reflectively recreate itself becomes impossible. The formation of a machinic imaginary is the becoming-alien of the social imaginary to itself, producing an existential alienation within social-historical becoming. What, then, a praxis of reflective articulation of the social-historical world might look like within in this new context is the ultimate question asked in Part III of the thesis.

Having presented this general overview, I now introduce the broad thematic of world articulation, followed by a chapter outline.

World Articulation

A central concern of this thesis is the process of *world articulation*. That is, how imaginary worlds—the worlds we inhabit—are built through interaction, and how those worlds overlap and institute a broader social-historical world. More specifically, this thesis is concerned with the way in which the technological environment contributes to the process of social-historical becoming. Following Castoriadis, it will be maintained that imagination is a creative process of world articulation found at every level of being from the micro-organism to the human and the greater movement of social-historical becoming.

Phrased differently, this thesis seeks to explore the limits of the idea proposed by Matthew Fuller in *Media Ecologies* that "All objects have a poetics; they make the world and take part in it, and at

the same time, synthesize, block, or make possible other worlds."[6] It sets about to understand how computational objects and processes (algorithms, machines, and media ecologies) make and take part in the world, how they infect, inflect, and engender the vectors of imagination that make the social world. What follows from this is the axiom that the generative capacity referred to as 'imagination' is not confined to the human mind. Imagination, I argue, is a dynamic process of being; a process located in the media and technological ecologies of our lives. This thesis explores how technological modes of being are creative and imaginative, in the sense that they make the world they inhabit (Part II).

The speculative suggestion that computation is a mode of being is derived from the post-phenomenological speculation that a world is expressed in the interaction of an organism with its environment.[7] The argument being that the "subjective instance" of the emergence of a world of (proto-)meaning can be extended to contemporary computation.[8] I will argue that computational process are (ontogenetic) modes of existence,[9] which have the capacity to interact with and learn through the analysis of structured and unstructured environmental data (for example, data scraped from social media, digital photographs, financial data sets, or embedded sensors). The various idiosyncratic forms of technical processes of abstraction[10] and action, which gather and process information from the environment (machine learning, evolutionary algorithms, or large-scale machine ecologies),[11] express the world in a manner that can be described as imaginative. In other words, these technical processes *articulate a world* through the interaction and organisation of their environment in such a way that it is coherent to their own 'logics'.[12]

Take for example, the connectionist approach to programming artificial intelligence (AI). The connectionist approach is based in on the principle of *learning*. It is the most prevalent AI technique used today. As opposed to the top-down approach of symbolic AI, learning is a bottom-up strategy that places a learning algorithm into a data environment. A learning algorithm interacts with its environment by analysing data according to a predefined goal (which can be as loose as "find a pattern in the data").[13] Learning of this sort can be described in its

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[6] Fuller, 2007, p.2.
[7] Castoriadis, 1990.; Simondon, 2005b.
[8] Castoriadis, 1990, p.119. On Castoriadis' notion of a "subjective instance" see Adams, 2011, pp.181–189.
[9] Simondon, 2016.
[10] See Whitehead (1985, p.25–26) on abstraction.
[11] Farmer and Skouras, 2013.
[12] I use the term 'logics' to encompass the range of material and semiotic dimensions of a mode of being. In the case of computation that includes everything from the architecture of a neural net to the mathematics of a model to the electrical engineering of the hardware. An analogous concept is Donna Haraway's "material-semiotic" (2008, p.4).
[13] This environment may be a static dataset or a dynamic flow of inputs from a 'local environment', whereby local

most fundamental terms as a dynamic relation between sense (input) and action (output) organised by a problematic (e.g. the output task as it relates to the input data).[14] The problematic tension between sense and action generates an abstract schema, which forms a self-centred 'world' (*umwelt*).[15] However, the notion of world in this case may seem odd, because the world of the learning algorithm is an abstract and formalised computational world that exists as a mathematical model rather than a world of situated, bodily experience (although there are nonetheless materialities of different kinds at play in computing). The aesthetic character of the machinic world (in the broader sense of *aesthesis*) is therefore a direct consequence of the computational logic that articulates it (see Chapter Four). It is therefore certainly very different to the world experienced by a human, but *it is a process of world articulation, nonetheless*. At least, this is the conception of world used in this thesis, and which will be further defined and defended in Parts I and II. The abstract models of the world generated by the patternings of learning machines may be relatively simple compared to the phenomenological complexity of a human, or even perhaps that of a tick (to use Uexküll's famous example). Nevertheless, when placed within a social-historical field of interaction these machinic patternings produce a world of sufficient complexity to be deemed worthy of phenomenological interrogation. Speculative interrogation of the mode of experience of abstract mathematical models cannot be undertaken through orthodox phenomenological methodology. Therefore it is necessary to develop a post-phenomenological method for thinking through the phenomenological implications of learning in computational systems.

The reason such a study is necessary is that, as Anna Tsing argues, history is the accumulation of multi-scalar entanglements of world-making trajectories that includes humans as only one dynamic amongst others.[16] Computational media is one of those world-making trajectories. Tsing makes it clear that to speak of a multi-scalar world is to speak of the "heterogeneity of space and time" with its "mosaic of temporal rhythms and spatial arcs."[17] This in turn highlights the asymmetrical relations of power that produce the world. Recognition of the transsubjective multi-scalar entanglements of lived space and time sheds light on the "disturbance-based

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means both in Euclidian space (e.g. using sensors), and topological locality through networked connection (such as data from sentiment analysis). (Or somewhere in between as is the case of two models used in GANs.)

[14] This will be variously unpacked throughout Part II.

[15] The term *'umwelt'* comes from the work of Jakob von Uexküll. The literal translation from German is environment. However, in Uexküll the word is generally understood to mean a *world for some subject*. The use of the term in this thesis is, therefore, meant as an intentional provocation to think about the extent to which there is a semblance of intentionality in a dynamic computational model. That is, to the extent that a model is an attitude towards the world that orients action. Uexküll, 2010.

[16] Tsing, 2017, p.135.

[17] *Ibid.,* p.4.

ecologies in which many species sometimes live together without either harmony or conquest."[18] Through such analysis we can begin to map the different forces or subjectivities that exist concurrently, sometimes encroaching on one another, sometimes acting in tandem, sometimes oblivious to one another. It is in this sense that this thesis studies the computational processes acting within and on the social world. The argument being that there is a transsubjectively instituted social-historical movement that traditional ontological categorisations cannot account for, because even while there is a 'generic' transsubjective field, it is a self-differentiated more-than-unity, as the fragmentary forces constituting it are of radically different orders.

Speculative theorisations of this kind have implications for boundary-marking discourses concerning what the human is, and the post-human challenges to traditional humanism therein. It is to this end that much of the recent literature in new materialist philosophies (such as Tsing's) has engaged with world making. Following this trajectory beyond the ontological, the world-making capacity of technology sets a foundation for a sustained critical inquiry into computational society. This raises the issue of what a more pluralistic phenomenological approach might entail for the question of what kinds of transformative political strategies are possible in a networked society. It is in this regard that this thesis overlaps with a revival of the notion of 'world disclosure' within a philosophical discussion of the renewal of critical theory in the twenty-first century.[19]

This critical dimension of world disclosure turns around the concept of "reflective disclosure", a concept proposed and developed by Nikolas Kompridis in *Critique and Disclosure: Critical Theory Between Past and Future*. In his book he defends a synthesis of Heideggerian phenomenological world disclosure and critical theory. However, the anthropocentrism of Heidegger's phenomenology strictly delimits meaning to *Dasein*, thus foreclosing any possibility of a machinic imaginary.[20] Instead, what is required is a *post*-phenomenological theory of meaning to demonstrate how processes of signification and meaning-making occur throughout all regions of being, including the 'inanimate', animal, and even the artificial.

This post-phenomenology will be constructed through a synthetic reading of the work of Cornelius Castoriadis and Gilbert Simondon. Castoriadis' thought, in particular, is an attempt to develop a theory of world articulation [*mis-en-forme du monde*] across multiple strata of being that takes us beyond the human *qua Dasein*. Castoriadis arrives at this conclusion by rethinking the notion of world-disclosure as world-articulation through the concept of imagination, aiming

[18] *Ibid.,* p.5.
[19] Kompridis, 2006.
[20] Heidegger, 2013, p.193 [151–152].

towards a definition of social-historical and political collectivity. It is for this reason that the use of 'articulation' in this thesis is favoured over 'disclosure'. The concept of 'articulation' highlights the radical political connotations and central commitments driving Castoriadis' ontology of the social-historical. Articulation also provides an additional advantage of situating Castoriadis in relation to other thinkers of praxis who deploy the notion of articulation, such as Antonio Gramsci and Stuart Hall.[21] Moreover, as discussed at length in Chapters Two and Three, using the term articulation shifts the underlying ontological commitments away from a Heideggerian notion of Being that is disclosed to us, towards a Merleau-Pontian ontology of expression.

In fully fleshing out his theory of world-articulation, Castoriadis goes as far as to expound a philosophy of nature to locate the origins of the creative power of imagination in the pre-Socratic concept of *physis*. Suzi Adams describes this philosophy of nature as the development of a poly-regional ontology, i.e., a pluralist expansion of the notion of world that includes non-human life.[22] Nevertheless, while Castoriadis argues that the creative dynamic force of imagination exists across the whole of the biological field, the artificial remains, in his thinking, non-ontological in the sense of creating a world for-itself. This is—in the argument offered here—because of an under-theorisation of the technical in Castoriadis' thinking, only engaging with technique to the extent that he recognises it as an important dynamic of the making/doing of history.[23]

Simondon's work concerning the mode of existence of technology—that technical objects produce a world of their own (they co-constitute their milieu)—thus provides a crucial opening to extend Castoriadis' initial thrust towards a poly-regional ontology (a stratified ontology of differentiated regions of being-for-itself). With Simondon this poly-regional ontology extends into the field of the artificial. Simondon was, however, writing in the mid-twentieth century when computation was yet to become the dominant technological paradigm. For this reason, his philosophy of technology—which borrows the notion of individuation from his own philosophy of nature—is primarily concerned with energetics. Focus on energetics alone is deficient for a comprehensive theory of computation considering the latter is, in a fundamental

[21] Castoriadis is most well-known for his rejection of the rationalist tendencies of Marxism, it was precisely because of his commitment to the element of praxis found in Marx that led him to reject the Marxist analysis of history and society. There are parallels with the Gramscian perspective worth exploring, however, this is beyond the scope of this thesis.
[22] Adams, 2011.
[23] Castoriadis, 1984a.

way, mathematical and abstract (although that is not to say it is 'immaterial').[24] Shifting back to Castoriadis allows us, therefore, to rethink Simondon's philosophy of technology through an engagement with reason and abstraction. Castoriadis provides a useful counterweight because his philosophy of imagination is a critical engagement with how reason is historically instituted, and how, in turn, reason structures the world. Moreover, by reading Simondon's philosophy of technology as a continuation of his philosophy of nature, it is possible to develop a theory of signification that can include computational processes, and technical individuation, as inherently meaningful.

Approaching computation though a synthetic reading of Castoriadis and Simondon provides a new avenue of critical engagement with the machinic processes that surround us. While projects like Johnathan Grey's "Data Worlds" use the theory of world articulation to understand how we come to think like our machines, a post-phenomenological critique explores world articulation in the opposite direction, i.e. how our machines think without us.[25] The increasing independence of machines that interact with and act within the social world requires a consideration of how the social imaginary is being reconfigured. Adjacent to the popular discussion of the way in which computation augments human imaginaries, the question of this thesis is *whether machines are themselves imagining*. How do the imaginaries of machines create novel constructions, interpretations, and articulations of the social world in which they, and we, are embedded? Or to quote Felix Guattari, "How do certain semiotic segments achieve their autonomy, start to work for themselves and *to secrete new fields of reference*?"[26]

The answers to such questions are important in orienting our analysis of what kinds of politics are possible in computational society.[27] Not simply because technology provides a *means* to think differently about the world, but because the possibility of a machinic imaginary raises the issue of the highly fragmented process of creation of the social imaginary extending beyond psycho-social activity. A key thesis I am proposing is that the human experience of the social horizon of intelligibility is *out of phase* with the computational horizon of intelligibility, even while both humans and machines co-produce the social world. Put otherwise, the social imaginary, and the social-historical dimension of being, are *self-differentiating processes*. It is in this sense that it can be said that the social imaginary *becomes computational*—in a transformation analogous to what is

[24] Parisi, 2017.
[25] Johnathan Grey, 2018.
[26] Guattari, 1995, p.13.
[27] Politics broadly understood as the capacity to think propositionally about the organisation of the social world, and the strategies and tactics required to meaningfully organise the world according to such propositions. (A reinterpretation of the definitions of power and politics proposed by Hlavajova, 2015, p.12.)

elsewhere referred to as "post-human", "inhuman", or "more-than-human" (each with a distinct set of intentions and problematics attached). This computational dimension of the social requires rethinking political and existential models predicated on previous human modes of reasoning and imagining.

To phrase this differently, how humans make sense with data, or with computational media, is only part of the picture. To complete the picture we need to interrogate how the technical systems we are surrounded by, affected by, and in many ways controlled by, make *sense of us* by processing data according to the mathematical-logical parameters of computation. This investigation into the computational use of human society does not, however, necessarily entail an approach, such as Actor Network Theory (ANT), affording all actors with equal agency.[28] Instead the intention is to explore the different scales and kinds of becoming that make up a transindividuation of the social-historical world, without collapsing them into a flat, unified field of agency.

Moreover, while this study is an exploration of the dynamism of the formal structure producing our social world—i.e. the logics of computational mathematics—the aim is to avoid falling back into the rigidity of a structuralist account. The shifting dynamic of this technical structuration is made evident by examining the ontogenetic individuation of those formal systems in terms of their *ability to learn*. The computational processes that make up the architecture of contemporary digital culture are constantly evolving, learning, adapting, and *imagining* (i.e. they make or articulate a world-for-themselves). They do so with a certain (increasing) degree of autonomy or independence from (human) oversight. This evolving computational background to our lives poses a political and existential problematic that this thesis seeks to develop: how do we re-imagine, re-articulate, or "reflectively disclose" the social world and social institutions if computational media is partially articulating the social world and institutions according to its own logic?[29] This is a new problematic not yet covered in the literature on the social imaginary (Castoriadis), world disclosure (Heidegger), lifeworlds (Husserl), or *dispositif* (Foucault) because computational logic differs from previously defined *a priori* structures.[30] Computational infrastructure is more than "a situated set of social practices" like language,[31] it is an *inhuman* mode of reasoning that extends the social horizon of intelligibility *beyond the capacity of (direct) human experience*. The consequences of this proposition will be considered in the final part of this

[28] Latour, 2005.
[29] Reflective disclosure is the term Kompridis uses, analogous to re-imagination or re-articulation, as reviewed in Chapter One. See Kompridis, 2016.
[30] Castoriadis, 1987; Heidegger, 2013; Husserl, 1984; Foucault, 1980, pp.194–228.
[31] Grey, 2018, p.6.

thesis.

Chapter outline

This thesis is divided into three parts and is recursive in structure, each part producing a set of problematics that are passed on to and reconfigured in the next, raising further questions for consideration. In this manner, the movement of the thesis takes place through the logic of transduction. As described by Simondon, transduction is not a logical procedure in the standard sense of having a proof value, but rather an individuation of thought. As Simondon writes, "the operation of individuation", in distinction to the dialectic, "does not seem to correspond to the appearance of the negative as a second stage, but to an immanence of the negative within the initial condition through the ambivalent form of tension *and* incompatibility."[32] Transduction works through the problematic by integrating tensions and incompatibilities into a new structure. Transduction is

that through which a structure appears in a domain of a problematic as providing the resolution to the problems posed. But contrary to *deduction,* transduction does not go elsewhere to seek a principle to resolve the problem of a domain: it extracts the resolving structure from the very tensions of this domain…It is in this sense that transduction is a discovery of dimensions whose system makes those of each of the terms communicate, such that the complete reality of each of the terms of the domain can become organized into newly discovered structures without loss or reduction.[33]

Each part of this thesis develops a problematic that resolves into a new structure in the next part, maintaining the tensions carried forward. Simplifying greatly, the tension between technology and imagination in the literature is integrated into a theory of machinic world articulation, which in turn generates a new set of tensions and a new political and existential problematic: the alienation of the machinic imaginary. Thus the individuation of the thesis is towards a problematic of ever-greater complexity.

Part I serves as a contextualisation of the problems the thesis aims to address, setting out the theoretical field of intervention and critical implications of the machinic imaginary in relation to 'technopolitics' and 'politics of imagination' (Chapter One) and the philosophical framework of 'post-phenomenology' (Chapters Two and Three). Part I thus presents the political problematic

[32] Simondon, 2020a, pp.14–15.
[33] *Ibid*., p.15.

of the critical project of reflective articulation in computational society, which dovetails into the methodological problematic of the world in post-phenomenology. The dual problematic from Part I is synthesised in Part II with an encounter between the theoretical resources of post-phenomenology and computational society. Part II functions as an 'empirical' case study in the form of the speculative proposition of the machinic imaginary. The application of the post-phenomenology in an analysis of computation and machine learning produces the core speculative 'object' of this theoretical research: the proposition of a machinic imaginary emerging as a creative force instituting a region of being-for-itself within the social-historical world (Chapters Four, Five and Six). Thus a further problematic arises for the critical resources developed in Part I: reflective articulation is undermined by the self-differentiation of the social imaginary into human and machinic orders radically alien to one another. Finally, Part III is an analysis of the implications of Parts I and II, exploring the existential and political problematics generated by the existence of a machinic imaginary (Chapters Seven and Eight). It draws out the problematic of the alien machinic imaginary from Part II, and returns to the questions posed in Part I concerning a critical project of reflective articulation in computational society.

To expand on the above, Chapter One provides the context of the thesis in relation to current debates in the literature regarding the technopolitics of computational society. A broad definition of computational society is given, followed by a detailed review of a range of contemporary theoretical engagements with computational society in relation to politics. While there is a much broader literature on the various cultural dynamics of computational society, the focus is on the explicitly political dimension of the debate about digital technology, new media, and regimes of calculation.[34]

The decision to narrow the focus to the explicitly political dimension of the literature, as opposed to the more implicitly political aesthetic dimension of computational culture, is to interrogate the range of practical propositions for political action. What this emphasis on political propositions highlights, however, is the gap that exists between discussions of technopolitics and the more general political and critical theory that engages with the problem of "capitalist realism" and other forces of hegemony,[35] which I am broadly defining as the 'politics of imagination'. On the one hand, the politics of imagination covers a broad range of political and critical responses to our current political moment through the exploration and proposition of alternative logics, systems, epistemologies, futures, and worlds. Approaching the

[34] See for example the online journals: *Computational Culture: A Journal of Software Studies* at http://computationalculture.net/ and *ctheory* at http://ctheory.net/
[35] Fisher, 2009.

question of the political from a different perspective, much of the literature that explicitly engages with technology tends towards a discussion of governmentality and control. The briefest review of the historical literature on imagination will show why this is the case: imagination and reason have often been held as distinct faculties for millennia in Western, Vedic, and Islamic philosophical traditions.[36] This thesis therefore aims to overcome the antinomy between the free, creative expression of a politics of imagination, and the predictive, control mechanisms of cybernetic governmentality.

The critique of governmentality and control is indispensable for a political engagement with the politics of twenty-first century media because cybernetics is a central organising principle of computational society. Cybernetics is a "central imaginary signification" (to use a term from Castoriadis),[37] it is a core cultural logic through which technological society institutes itself in the twenty-first century. Understanding the relation between cybernetics and the social imaginary opens the possibility for an analysis of the imaginary function of the logics of computational technology in creating the social world, providing the link to the less technologically-focused discourse of the politics of the imagination. The final aim of the thesis is to construct the political and existential problematic of the fragmentation and alienation produced by the differentiation of modes of world articulation within the imaginary institution of society, with specific reference to the machinic imaginary as a dimension of the latter. Therefore, an elucidation of the patterns of ordering and logics of creation that produce and reproduce the world as a social imaginary is arguably a vital place to begin an inquiry. Kompridis' proposal for a reorientation of critical theory through the phenomenological notion of world disclosure or world articulation, if applied to technology, serves as a bridge from the politics of imagination to technopolitics.[38] The first chapter therefore ends with an initial argument for how such a critical theory of reflective articulation, in the context of contemporary computational society, can be developed though a post-phenomenological reading of the philosophy of Castoriadis.

Chapters Two and Three extend the discussion of the literature on computation into a methodological discussion of computation in relation to phenomenological and post-phenomenological critiques of technology. Critically extending phenomenological themes beyond the limitations of the tradition, a post-phenomenological methodology will be developed to account for the conditions of possibility of a machinic imaginary. Chapter Two explores

[36] A more detailed history of the concept of imagination is not possible here. However, there are several excellent texts covering this topic. To cite a few: Lennon, 2015; Shulman, 2012; Kind, 2016; Bottici, 2014.; Bäck, 2013.
[37] Castoriadis, 1987, p.362.
[38] Kompridis, 2011.

contemporary phenomenological interventions into the philosophy of technology and media theory from Mark Hansen, and Yuk Hui.[39] The commonality in the phenomenologies of technology of Hansen and Hui (as well as Bernard Stiegler) is the degree of orthodoxy in their reading of the tradition.[40] However, the direction in which they attempt to stretch and expand the phenomenological critique of technology opens up the methodology in constructive directions. Hansen synthesises Edmund Husserl's phenomenology with Alfred North Whitehead's speculative philosophy towards a 'speculative phenomenology'. Hansen argues that twenty-first-century media functions as a "worldly sensation", though which the world of sensation we inhabit is actively sensing and thus expanding our phenomenological capacity for sensation. Hui, on the other hand, following Bernard Stiegler, develops his phenomenology from Husserl to Martin Heidegger, which is synthesised with Gilbert Simondon's philosophy of technology. Hui proposes an ontology of the digital object from which he builds a picture of the technical "interobjectivity" (digital milieu) that supports phenomenological intersubjectivity. He goes on to develop what he calls "organic philosophy" to theorise the transindividuation of the inorganic technical system. This leads him to propose a thought-provoking response to the contemporary technical condition of humanity. However, neither Hansen nor Hui overcome the limitations of the phenomenological method because they remain wedded to an anthropic subject-centred phenomenology. Accordingly, even while deepening the relation between *anthropos* and *techne*, there remains a latent functionalism that reduces the latter to an instrument without a world-in-itself. While Hui comes closest to the notion of a self-grounding technical system with his concept of the "organising inorganic", I hope to push this idea much further by evaluating the self-differentiating characteristic of the social imaginary with the advent of a fully machinic imaginary dimension.

Chapter Three is therefore intended to push the phenomenological method beyond its own boundaries towards a *post*-phenomenology of technology. To do so, the philosophy of Maurice Merleau-Ponty is explored, with particular reference to his later ontological "turn to the world" in *The Visible and The Invisible*.[41] From Merleau-Ponty's own engagement with the limitations of phenomenology towards the end of his life, it is possible to construct a post-phenomenology by extending the themes of his late period into a reading of Castoriadis and Simondon. Through a synthesis of these three thinkers the post-phenomenological methodology of this thesis is developed towards the proposal of a machinic imaginary and theory of computational world articulation. In doing so the concept of *transsubjectivity* is introduced, along with a defence of the

[39] Hansen, 2015.; Hui, 2016a; Hui, 2019.
[40] Stiegler, 1998.
[41] Merleau-Ponty, 1968.

onto-phenomenological extension of meaning into nature and technology. Once this methodological groundwork is complete, it will be possible to turn to computation itself to explore the machinic imaginary.

Part II develops the post-phenomenological methodology through an analysis of the computational techniques and processes that constitute learning in machines (Chapter Five) and large-scale machine ecologies (Chapter Six). The purpose of Part II is to define and describe the machinic imaginary, which is the core speculative proposition of the thesis from which the series of problematics I explore unfold.

This begins in Chapter Four with a theoretical development of the post-phenomenological resources of Castoriadis and Simondon in the context of contemporary computational society. The purpose of this chapter is to construct the conceptual tools required to describe the machinic imaginary. Castoriadis' theory of social imaginary signification is explained in more depth and extended into a proposition of machinic signfications. Social imaginary signfication is expressed in social activity—'social doing' as Castoriadis terms it. Machine learning is a metabolisation of social activity into computational regimes of calculation, with machines increasingly coming to define what data is actionable according to non-human computational logics (for example, deep learning). Thus, as machines participate more and more autonomously in social activity, the social doing of machines—defined by computational logics—results in the expression of machinic signfications in that social activity. The concept of machinic signification is explored further, with some premilinary examples. The notion of machinic signification is crucial for the description of the machinic imaginary in the following chapters, and feeds forward into Part III: it is the non-human character of these significations that produce the incomprehsibility of the machinic imaginary and therefore, its alienating effects.

The second half of Chapter Four draws on the philosophy of nature of Castoriadis and Simondon. Their poly-regional ontology is extended to include a region of being-for-itself expressed by computational technologies that have machine learning and interaction at their core. Castoriadis' concept of being-for-itself is defined, and the justification for extending its application to computational technologies is presented. The concept of *ur-signification* is introduced, which is key to the description of the proto-worlding of machine learning explored in the next chapter. Finally, Simondon's concept of information and his theory of the image-object are introduced, providing further theorisation of how machinic signification takes place.

Chapter Five shifts into a more empirical register with a narrativisation of the emergence of the

machinic imaginary through a history of machine learning. Key moments in the history of learning in machines are highlighted as stages in the emergence of a machinic world, including: early work on pattern recognition as an example of ur-signification; the ways in which certain learning techniques introduce a new temporal and spatial dimensions into computational reasoning; and the peculiarities of distributed representation in deep learning. Natural language processing is considered to demonstrate how machine learning models a world, the core example being transformer models, first developed by Google with BERT (Bidirectional Encoder Representations from Transformers) and made famous by OpenAI's GPT series.[42] Transformers simulate a form of attention that produces a certain temporal relation between their predictive mechanism and previous outputs.[43] The history of the emergence of this and other techniques are traced while developing the argument that they constitute creative modes of expression. It will be argued that this expression amounts to the creation of imaginary significations and the articulation of machinic proto-worlds, which act as subjective subtendencies feeding into a machinic imaginary.

Chapter Five moves from the micro-analysis of machine learning techniques examined in the previous chapter, to the macro-dynamics of interactive computing, machine learning 'in the wild' and the emergent properties of large-scale machine ecologies. The micro-processes of machine learning produce patterns that weave together to form a more complex machinic world as they participate in social doing. Thus while singular instances of machine learning are the pre-individual phase of the machinic imaginary, the latter is expressed in the complex dynamics of machine-to-machine interaction distributed across ever more areas of society. The first half of the chapter focuses on ways in which machines read the social world and how humans interpret machine processes. Studying the ways in which data is captured, stored, and analysed is essential to gaining an understanding of how the social world is instituted as a machinic imaginary. The interactive dynamics of the contemporary computing paradigm are considered, and it is argued that it is through interaction that a machinic imaginary is instituted, metabolising the social to further institute a machinic dimension of the social imaginary. The boundaries of interaction between human and computational horizons of meaning at the level of the social imaginary are thus considered with a view to discussing how they converge and diverge in the next chapter. A look at large-scale systems of machine-to-machine interaction—such as the machine ecologies of high-frequency trading (HFT)—provides a view of the scale of the impact that a divergent machinic imaginary might have on social dynamics. The argument will be that these clusters of

[42] BERT: Devlin, *et al.*, 2018; GPT-2: Radford, *et al.*, 2019.
[43] Vaswani, *et al.*, 2017.

computational processes are subjective tendencies within a larger process of social-historical transindividuation. The institution of the machinic imaginary is not, therefore, a mere repetition of the same but a process of self-differentiation driven by the specificities of computational logics augmenting and distorting social data as it is actioned into further social activity. The recursive dynamics of the interactive computing and machine learning reconstitutes the ground (the social imaginary) of machinic signification, thus producing a further development of the machinic imaginary. In this way, the social-historical institution becomes a cyborg process, fed not only by the activity and imagination of human social actors, but also autonomous machines and technological infrastructure. Thus, the creative capacity for invention and auto-constitution of the social world by humans has been transferred into autonomous technologies. This, in turn, creates a divergent machinic world that is at one time coexistent with human worlds while phenomenologically distinct, limiting understanding across the human-machine divide and creating an alienating cleft in social experience: the social imaginary becomes other to itself.

Part III carries forward the conclusions and questions of the previous two parts and explores the problematics produced by the concept of the machinic imaginary and post-phenomenology of technology. Each chapter works through these problematics highlighting the limitations to action entailed, and consequentially, what sort of praxis of the imaginary is possible, in an ethical register, as well as a critical and political register.

In Chapter Seven, the problem of incommensurability and fragmentation of orders is examined in depth. This fragmentation manifests due to machinic significations, operating within computational systems, expressing a world of a novel logical-aesthetic order beyond the human phenomenological horizon. The argument that the machinic imaginary is radically alien to human domains of meaning is unpacked in detail, and implications of the machinic imaginary as the source of a new form of alienation is explored. How machinic significations are socially instituted, even while a fragmentary poly-regional ontology of the social persists, is key to the question of praxis in contemporary computational society. The extent to which intentional action can intervene in the reflective articulation of the social world as an ongoing critical project is therefore examined. Importantly, this demonstrates that there are certain limits to any such approach, and that a form of alienation is produced by the self-differentiation of the social imaginary into machinic and human imaginaries that can only interact indirectly.[44] The effects of

[44] The term alienation is used here in conversation with the sense Simondon defines: "Beneath this juridical and economic relation exists an even more profound relation, that of the continuity between the human individual and the technical individual, or of the discontinuity between these two beings…Alienation . . . emerges outside of all collective relation to the means of production, at the physiological and psychological level of the individual properly speaking" (Simondon, 2017, p.133). As Simoon Mills has highlighted, Simondon's definition of alienation does not

this alienation are considered and an ethics of responsivity to the alien is outlined. The issues of opacity, translation, and interpretation of computational systems are highlighted, and a critique of interpretable AI is given to further assert the fundamental problematic of alienation, and the phenomenological incommensurability between orders produced by learning in machines.

Chapter Eight is a culmination of the previous chapters through a return to the problematic of technopolitics after the fragmentation of the social imaginary. When seen through the lens of computational world articulation, where does the analysis of computational society lead to in terms of a politics of reflective articulation? How does this problematic of the becoming-technological of the social imaginary reorient how a praxis of reflective articulation must be conceived? This chapter proposes to think through social-historical becoming through the concept of transsubjectivity in relation to the findings of the previous chapters. Transsubjectivity provides a conceptual tool for a transversal reading of the social imaginary as composed of partial overlappings and "intraactions" of fundamentally different orders of abstraction and action.[45] A post-phenomenologically inspired praxis is one that is rooted in a pluralistic ontology of the world understood as a generative problematic; a world that is never fully intelligible from any one position and therefore always in a process of rearticulation. The intention of this chapter is to reconstruct some notion of politics, subjectivity, the human, technology, and society in light of all the problems raised by the speculative proposition of the machine imaginary and the consequences it has for these concepts. The ultimate conclusion is of a philosophically pessimistic tone, as it pertains to the fundamental limitation the machinic imaginary places on any politics of the imagination. At the same time, however, it is argued that this existential and political limit should serve as a *heuristic* for reflective activity *qua* the social imaginary institution of society.

As a whole, this research project is initiated by mapping a problem space between the technopolitical conception of a totalising governance of cybernetic control, on the one hand, and the raw capacity of the radical imagination to create the world anew, on the other. This frames the core focus of attempting to show how the free and wild creation of new norms and meanings by the radical imaginary is entangled, prefigured, and often restricted by a matrix of competing and often unintelligible creative processes of world articulation, with specific focus on the machinic imaginary. With the post-phenomenological approach developed and tested in this thesis, I hope to open up the question of this transsubjective dimension of experience so

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differ from Marx's concept as much as Simondon suggests. However, Simondon's definition does highlight an important dimension of alienation in relation to technology. See Mills, 2016, pp.123–128.

[45] Barad, 2007.

that it might be possible to comprehend the extent of our alienation from the creation of the social-historical world, and the extent to which we do and do not have the capacity to transform the conditions of possibility for thought and action.

Part I

Chapter One: The Politics of Computational Society

Having explained the wider scope of the thesis in the introduction, this chapter details the contextual problematic to which the thesis is responding. It reviews the literature on computational society, examining the major strands of critical technopolitics that can be found in the media theory, philosophy of technology, software studies, and digital cultural studies. In doing so, the rationale for turning to Simondon and Castoriadis as the main references to the overall theses are introduced.

Computational Society

The term 'computational society' is here used to refer to the cultural formation of the social imaginary according to the general regime of calculative reason which has its roots in logic and mathematics. Hence, beyond the narrower sense of computation commonly used today in reference to digital media technologies, in this thesis computational society encompasses the longer history of computation and control prior to its mechanisation and the emergence of capital.[46] That being said, the revolution computation has undergone since Alan Turing's famous 1936 paper—computation's algorithmic and discrete-digital mechanisation leading to the modern electronic computer—is incredibly profound.[47] Digital computation will, therefore, take the foreground in the subsequent discussion, while always implicitly referencing computation in the general sense.[48] Historical periodisation of the current moment has numerous monikers.[49] However, while these terms each emphasise different social, cultural, and political developments during this period, a common theme is that computational reason and its material expression in information technologies has had an undeniable impact on global society.

Using the term computational society thus explicitly foregrounds the calculative, computational forms of reasoning that create the social-historical world, and highlights that this is a historically new techno-social "world articulation" [*mis en forme du monde*].[50] As Matthew Fuller explains "a lot of computing is now done in and through the social, and a lot of culture is now carried out or

[46] Mitchell, 1988; Rabinow, 1995; Stoler, 2009; Amaro, 2022.
[47] Turing, 'On Computable Numbers, with an Application to the *Entscheidungsproblem*', 1937, pp.230–265.
[48] The illegitimacy of isolating the digital from its wider context is clearly evidenced in the discourse around machine learning, which will figure as one of the framing objects of this study.
[49] Rifkin, 2011; Schwab, 2017; Castells, 1998; Amin,1994; Jameson, 1991; Deleuze, 1990b.
[50] "*Mis en forme du monde*" is Merleau-Ponty's concept, which Jóhann P. Árnason translates as "world articulation". Árnason, 2003, p.294.

executed in computational environments as they are also, in turn, changed by their involvement in space, cities, systems of semiosis, and so on. This kind of conjunction is the real richness of the present moment."[51] Studying this conjunction not only reconfigures our understanding of culture and society, it also opens up a space in which computation can be comprehended from beyond the narrow perceptive of computer science. The inherently socio-cultural character of computing means it is both possible and necessary to consider the notions of the social imaginary and world articulation in terms of computation.

Within computational society every process and relation has become potentially calculable, computable, controllable. A prevalent image of global capital in the twenty-first century is as a vast computational megastructure, a space of flows in which everything has become a node in the network.[52] Not only have social relations been digitised and modulated on social media,[53] with the internet of things (IOT) quotidian objects have also become interactive as they connect to the network and become "smart" along with the cities they inhabit.[54] Labour has become fragmented and dispersed onto the distributed platforms of the "share-economy" (the uberisation of labour),[55] and high-frequency trading algorithms interacting at the speed of microseconds feed on data scraped off social media networks by sentient analysis bots. Huge cloud computing data centres sat in remotely located warehouses contribute to accelerating climate change,[56] while satellites monitor the environmental devastation from space. Computational society is produced and reproduced through technical means. Theorising the social imaginary today therefore requires accounting for the influence and effects of such widespread technological mediation of everyday life.

What are the politics of computational society? As one would expect, the theorisation of the informational infrastructure that shapes the contemporary social field and cultural processes leads to a range of political positions which will be here referred to as "technopolitics".[57] Technopolitics being the myriad political and critical engagements with technology, and the technological critiques of politics. The term refers not to a single school of thought, but rather a critical dialogue that can be found across cultural, political, and critical theory. Examples range

[51] Fuller, 2013.
[52] Manuel, 1989.
[53] Kramer, Guillory, and Hancock, 2014.
[54] Songdo in South Korea, for example, is a newly built "smart city" in which everything is networked, from water filtration and rubbish disposal, to housing and road infrastructure. On Songdo, see Halpern, 2014. On smart cities see: Kitchin, and Perng, 2016.
[55] Nurvala, 2015, pp.231–39.
[56] Oró, *et al.* 2015.; Ebrahimi, *et al.* 2014.
[57] Armitage, 1999.

from Marxist autonomia,[58] deep-ecology anarchism,[59] and post-structuralism,[60] to recent theoretical debates calling for acceleration of techno-capitalist logics towards a post-capitalist future.[61] A non-exhaustive list of technopolitics would also include range of critical engagements with technology and identity (gender, race, sexuality, and disability),[62] the broad literature on data politics, algorithmic policing and incarceration,[63] as well as the discussion concerning the algorithmic governance of borders and logistical networks.[64]

As the focus of this thesis is concerned primarily with the extent to which the social imaginary is *technologically* constituted, this literature review evaluates the way in which, within contemporary theory, the world is understood to be articulated—imagined—by socio-technical process, actors, and agential tendencies. What is found when one reviews this literature is that the articulation of the world is reduced to the functional automatism of the cybernetic model of technology. This leaves no space for imagination or the imaginary in the technopolitical critique, without going *outside* the cybernetic system. The digital is reduced to an automation of thought that has no possibility for creativity or expression other than the glitch or error. Such a model of computation seems only to allow difference to come from outside the system. This is a consequence of the same ontology and phenomenology of the digital found at the root of all these theories, for which no space is allotted for the existence of multi-logical worlds within the cybernetic, computational, digital system. In this generally held account, the cybernetic system is not self-differentiated; difference only partakes of being in the analogue, the digital is mere repetition of past data. The continuum of the analogue is, in this way, posited as superior to the discretisation of the digital.[65] This elides the implications of computational incomputability, and the infinities introduced into the digital from interaction folding the outside of computation into its processing.[66]

Consequently, certain programmatic responses arise to the technopolitical situation derived from this generally held analysis. Of these technopolitical responses, it is possible to define a broad division between two major strands: acceleration and design on one hand, refusal and sabotage on the other. What is missed by both categories of programmatic response, I argue, is the possibility for any discussion of the imagination. The emphasis on a 'radical outside' forecloses

[58] Cleaver, 1993; Berardi, 2009; Dyer-Witheford, 1999.
[59] Bookchin, 2004.
[60] Deleuze, 1990.
[61] Srnicek and Williams, 2016; Mason, 2015.
[62] Cuboniks, 2018; Mbembe, 2017.
[63] Wang, 2018.
[64] Amoore, 2013; Cowen, 2014.
[65] Massumi, 2002.
[66] On incomputability see Parisi, 2013.

the possibility of creative, radical change, or differentiation *within* the logic of the 'system' itself. Even the notion of a system is potentially problematic in this regard because it suggests logical unity and closure, with an interiority and exteriority understood only as relation of alterity.

The discussion of imaginaries, and imagination, however, could otherwise be encapsulated in an alternative discursive framework, which is both parallel to, but often overlapping with, media theory and the philosophy of technology. What I call the "politics of imagination" is a catch-all term to describe the extensive political and critical literature that argues—through various methodologies and from various disciplinary perspectives—for the need for alternative imaginaries that can challenge capitalist-colonial-patriarchal realism.[67] This vast body of literature is coherent in seeking to challenge the existing order of things through the call to develop alternative theories for living, thinking, and being in the world. When trying to read across and between these two bodies of literature (technopolitics and the politics of imagination), an apparent tension emerges between the totalising tendency of cybernetic subjectification and the assumed voluntarism in the latter. However, it becomes clear there is a *shared image of technology* that reductively equates technology to a singular, totemic instrumentalisation of cybernetic-capitalist logic. This in fact extends the longstanding tradition of opposing imagination and creativity (*poiēsis*) to reason and technology (*techne*). Much like the technopolitical proposals, the politics of the imagination seeks an outside from which the system can be broken, its logic countered, or for an opening through which to exit entirely. I wish to provide a corrective to this binary choice through a development of a theory of imagination that does not rely on a radical outside but is instead immanent to the socio-technical assemblage.

Due to the extent to which, across this literature, imagination is regarded as the other of technological reason, the process of world-making in technopolitics is reduced to capture, control, and modulation. While there is much to agree with in the diagnosis of control and capture, current developments in computational technologies, especially in AI suggest the possibility of a more complicated understanding of change that begins with the imaginary dimension of technology. The resolution to the technopolitical problems created by the ingression of computational media into every aspect of social life need not be sabotage or exit, nor require a messianic contingent event to break the system. Neither is the simple acceptance and acceleration of the machine towards a realisation of its internal 'contradictions' a viable (or ethical) solution. Instead, following Castoriadis' analysis of the always-already self-differentiated existence of the social-historical and Simondon's theorisation of the technical, one need not

[67] Appadurai, 1990.

appeal to a mythical extra-social outside. The theory of the machinic imaginary can highlight the technological dimension of this self-differentiation. By detailing how this self-differentiation may further evolve, I will explore how the politics of imagination might navigate within such changing conditions.

Towards this end, the last section of this chapter begins to outline how a revolutionary programme centred around the imagination such as Castoriadis' project of autonomy produces a new problematic when applied to a critique of computational society. The final intention of this thesis, laid out in Part III, is to consider what sort of praxis is possible when taking into consideration the specificities and problematics inherent to action and thought in the age of ubiquitous computing. The section on Castoriadis in this chapter, therefore, serves as an initial consideration of how his philosophy of praxis and theory of the social imaginary frame my critique of contemporary theory concerning computational society and technopolitics. The relation between world articulation, the social imaginary, and praxis will be analysed through contemporary interventions into critical theory. A review of Kompridis' work on the synthesis of world disclosure and critical theory provides the foundations for a reading of the critical dimension of Castoriadis' notion of world articulation as praxis. The basic premise being that critique and elucidation are the tools through which a rearticulation of the world is possible when accounting for the difficulties presented by the theories of governmentality pervading the literature on technopolitics. Later chapters will then problematise this praxis by exploring the parameters set by the machinic imaginary in computational society. Before doing so, therefore, it is first necessary to map the field of engagement in which we first find ourselves to know where we need to go.

The first half of this chapter, therefore, outlines a key contemporary problematic with which any praxis of reflective articulation must contend. When surveying the literature on technopolitics, the problem faced by any attempt to theorise such a praxis seems, by many accounts, more insurmountable than ever in a computational society in which subjectivity appears to be increasingly captured (or capturable) and ceded to forces that reduce autonomy. Rather than deny this in favour of the power of the imaginary, this thesis delves into the problems facing all and any attempts to develop autonomy in relation to the technological mode of existence in which we find ourselves today. In the terms of this thesis, the self-differentiation of the social imaginary highlights a deepening fragmentation between the horizons of computational and human articulations of the world. This poses a problem for a straightforward approach to reflective rearticulation of norms in the sense that Kompridis proposes. As Jean-François

Lyotard once asked: "What if what is 'proper' to humankind were to be inhabited by the inhuman?"[68] This question is here reinterpreted as: what if the social imaginary were to be inhabited by the inhuman? What space of action might be made available by a political critique of this inhuman abstraction? The aim of this research project is to confront those problems and gain a deeper understanding of them.

Algorithmic Governance

A recent and influential text on the computational condition of contemporary culture is Benjamin Bratton book's *The Stack: On Software and Sovereignty*, in which he describes a multi-scalar image of the earth-become-computer, using the metaphor of "multi-layered software, hardware, and network stacks".[69] The Stack is composed of six layers: Earth, Cloud, City, Address, Interface, User, with each layer "considered in its own terms and as a dependent layer within a larger architecture".[70] Stacked upon one another, Bratton envisions a vertical, modular arrangement of different media technologies and infrastructures that interpenetrate and influence one another.[71]

This global 'Stack' is, according to Bratton, at one and the same time a literal and allegorical model of governance in the age of ubiquitous computing and planetary-scale computation. For Bratton, The Stack is *the state itself*. By this he does not mean that the Stack is a metaphor of the state as a 'machine' of repression in the Marxist-Althusserian sense,[72] or the Weberian analysis of the bureaucratic administration of state machinery.[73] Rather, this planetary-computational infrastructure is the state because it constitutes the actual capture and reconfiguration of sovereignty.

> The model [of The Stack] does not put technology 'inside' a 'society', but sees a technological totality as the armature of the social itself. It does not focus on computation in the service of governance, or in resistance to governance, but rather on computation as governance.[74]

This, he argues, requires a remodelling of previous theories of governance that align with the

[68] Lyotard, 1991, p.2.
[69] Bratton, 2015, p.4.
[70] *Ibid.,* p.11.
[71] *Ibid.,* p.4.
[72] Althusser, 2001, p.137.
[73] Anter, and Tribe, 2014.
[74] Bratton, 2015., p.xviii.

computational logics that now structure social and political life.[75] Bratton describes this new computational governance as a mutation, evolution, and even dissolution of the geographic history of modern sovereignty. Bratton develops Carl Schmitt's political-legal theory of the *nomos* as the spatial ordering of the earth as the grounding act of sovereignty. This *nomos* is produced through repeated and contested acts that striate the earth with borders, lines, and demarcations of inside or outside, friend or enemy. The Stack is both at once a continuation and discontinuation of this Schmittian sovereign capacity to decide. The Stack exerts sovereign power through its ability to decide and demarcate, to produce a topography and topology of both physical and virtual space.[76] Yet in doing so, it breaks and traverses the modern state form; with The Stack, transnational corporate interests act as sovereign powers. This striation of space materialises as fibre-optic cables crossing oceans and connecting the business hubs of major cities, or through the placement of data centres in particular sovereign territories—and even sunk out at sea[77]—while they serve users across the globe. These networks of technological infrastructure result in a "dedifferentiated space and the flattening superposition of multiple maps" that collapse old distinctions while producing new ones.[78]

Having built this image of a totalising sovereign power, Bratton's only political recourse is a design-oriented relation to the messianic. His is a politics derived from an abyssal ontology of opening to the contingency of the universal, which is an absolute outside from whence contingency strikes. The novelty of this contingency is absorbed as trauma into the functioning of the system.[79] For Bratton, change is dependent on the contingency of the system itself. Even while maintaining that The Stack is, to a certain extent, the outcome of deliberate but heterogeneous efforts and designs, Bratton suggests the coming into being of this "accidental megastructure" was a matter of historical contingency.[80] Reversing Paul Virilio's theory that with every new technology there is the inevitability of its associated accident, Bratton maintains that with every accident there is the potential of a new technology. In this regard the evolution of The Stack is driven by a dialectical movement of accident-design cycle.

With his reduction of computation to its functioning as a cybernetic control mechanism, Bratton's politics of design is similar to the accelerationist theory of Srnicek and Williams.[81]

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[75] *Ibid.*, p.8
[76] In "There is No Software", Fredrich Kittler reminds us that exclusion and filtering is integral to the procedures of computational media. Kittler, 1997, p.152.
[77] Cellan-Jones, 2018.
[78] Bratton, 2015., p.33.
[79] Armitage, and Bishop, 2013, p.202.
[80] Bratton, 2015, p.5
[81] Williams and Srnicek, 2017.

Bratton seems largely aligned with accelerationist politics in limiting it to a mere repurposing of the machine.[82] However, such a functionalist understanding of technology ultimately places machines in a position of subservience or domination in relation to the human. An alternative orientation for thinking about our relation to machines can be found in Gilbert Simondon's philosophy of technology. Simondon's concern with the ontogenic process of technological individuation provides an understanding of the relation between technology simultaneously from inside the technical object and at the cultural level.[83] He avoids a clear separation of techne and culture, while offering an analytical framework though which to understand the complex dynamic that cannot be reduced to either technical or cultural logics. The complexity of this integrated yet self-differentiating relation of different dimensions of the socio-technical is precisely what this thesis is trying to demonstrate. How do the action and abstractions of machines and humans both institute the social imaginary, and what does the difference between these two processes of institution tell us about the broader transindividuation of the social-historical? This bifurcation of the social imaginary will become clearer in Part II with the examination of learning and interaction in contemporary computational techniques. The introduction of learning in computation (machine learning, evolutionary algorithms, and so forth) is a key bridge across the apparently insurmountable gap between imagination and instrumental reason, and demonstrates that in fact imagination is not irrational, not the outside of reason. Hence, it is possible to propose a machinic dimension of the social imaginary.

In *The Imaginary Institution of Society*, Castoriadis maintains that the distinction between reason and imagination is that imagination precedes, or is at least co-emergent with, reason—instrumental or otherwise.[84] Rather, imagination must be understood as the process by which the world is disclosed, a world that includes reason. This requires, as Charles Taylor argues, a reconception of reason that includes disclosure as "a new department".[85] Castoriadis echoes this sentiment: "the critique of 'rationalism' presently underway leads to an irrationalism which is simply the inverse and to a philosophical position which is as old as rationalism itself. Getting beyond inherited thought presupposes the conquest of a new point of view, which that tendency is incapable of producing."[86] This new point of view is of reason as an imaginary institution, suggesting it is open to variation in form due to the ultimate indeterminably of being upon which reason is grounded. The critique of reason does not mean a rejection of reason but the positing of the

[82] Tiziana Terranova offers an explicitly transformative vision of appropriation of the technology of The Stack in Terranova, 2017.
[83] Simondon, 2016.
[84] Castoriadis, 1987.
[85] Taylor, 1995. p.15.
[86] Castoriadis, 1991a. p.53, translation from Breckman, 1998, pp.33–34.

pluralisation of reason. In other words, due to the creative capacity of imagination, there is a pluralisation of different forms of reason through which the world is articulated, which fragments the world into multiple perspectives, multiple articulations (this point will be returned in the following chapters).

As Orit Halpern has shown, with the design of feedback of environmental noise as part of the servo-mechanical functioning of machines, cybernetics—the new science of control that emerged in the 1940—had to develop a new concept of rationality that incorporated breakdown, glitch, and contingent events. This was radically different to the enlightenment concept of reason as exactitude. Halpern, following cyberneticians like Warren McCulloch and Gregory Bateson, describes this cybernetic rationality as *unreasonable* and *psychotic*. Psychotic rationality takes its socio-cultural and political form in risk management.[87] Risk being the paranoid hallucination of neoliberal capital that regulates and steers decision making. However, with the turn to interaction in computing, I suggest a more accurate psychological metaphor to describe these automated decision-making processes is Castoriadis' psychoanalytic notion of "defunctionalisation", which is key to his theory of the social imaginary.[88] Defunctionalisation of rationality marks the shift away from the commonly perceived rigidity of rule-based reasoning towards predictive inferential reasoning whereby input is not a functional equivalent to output. Just as the defunctionalisation of the human psyche affords a creative capacity (the imagination) by decoupling the psyche from the functionalism of the biological strata—machinic defunctionalisation opens the door to the possibility of a machinic imaginary.

The creative solutions to problematics that emerge within computational systems given the capacity to learn are the folding of the incalculable within reason, which is to say that there is now a fundamental level of unpredictability at the heart of computation. Techniques of learning in computation are therefore taken as a key object of study throughout this thesis. The methodological reason for doing so is that techniques of learning in computer science span across a range of fields of scientific inquiry and industrial practices, to the extent that machines with the capacity to learn are having a significant effect in the production of techno-capitalist reality. Machine learning is a method for parsing big data with the intent of producing *actionable knowledge*. With the introduction of machine learning into the interactive paradigm of computation there is an applied form of inferential reasoning that can be speculatively described as creative.[89] That is, the capacity to bring otherwise distinct levels of reality into relation is an act

[87] Beck, 1992.
[88] Castoriadis, 1997e.
[89] Goldin, Smolka, and Wegner, 2006.

of creative formation. Thus, through the generation of actionable knowledge by these creative machines, a range of novel forms of social activity becomes possible, which entails new processes by which social imaginary significations (machinic signification) can be instituted. I return to these ideas in Chapter Four.

Automation and Decisional Reasoning

Bratton's topographical-topological diagram of the apparatus [*dispositif*] of computational society is very much a macroanalysis (a systems-*cum*-platforms theory)—even when he drills down through the layers of The Stack as far as the "*User*". Alexander Galloway, on the other hand, diagrams this apparatus through a microanalysis of the protocols that regulate the networked world.[90] Galloway's concept of protocological control is similar to the model of governmentality found in *The Stack*. They both provide a detailed technical description of the apparatus [*dispositif*] of computational society as a form of governmentality that functions through a computational logic of control.

Following Deleuze's post-Foucauldian periodisation of power in "Postscript on Control Societies",[91] Galloway conceives of computational society as protocological control society, the subsequent historical phase of governmentality after bureaucratic power. Where bureaucratic control was a centralised hierarchical structure, control society is a decentralised, or *distributed* (to be more precise), form of power which exists in the tension between the horizontal and vertical structures of control (DNS, TCP/IP, node-to-node connectivity): "[I]nstead of governing social or political practices as did their diplomatic predecessors, computer protocols govern how specific technologies are agreed to, adopted, implemented, and ultimately used by people around the world. What was once a question of consideration and sense is now a question of logic and physics."[92] Galloway reduces deliberation and decision to a physical manifestation of computational logics in the structure of network infrastructures. Information technologies, such as the internet, have automated the networking of social relations previously regulated and governed by human individuals. The who, what, where, when, and how of social relations in the age of protocol is predetermined.

Protocol is thus the control mechanism of culture once it has become computational, the "conventional rules that govern the set of possible behaviour patterns within a heterogeneous

[90] Galloway, 2006.
[91] Deleuze, 1990b.
[92] Galloway, 2006, p.7.

system."[93] Decisions at this micropolitical level have an analogous effect of inclusion and exclusion as the sovereign decision, except that protocological power "engenders localised decision-making" not centralised or global decisions.[94] Louise Amoore calls these "practices of authorisation" when enacted under the auspices of the regulation of risk for population protection.[95]

Protocols are, in this sense, a form of "micro-decision", the interruptions which precondition every connection. Florian Sprenger suggests that these micro-decisions demand an analysis of "procedural escalation…that plays back and forth between automated execution and political interests, between the technical and the social."[96] Though the infrastructural imbrication of the social from the local level of micro-decisions up to the global megastructure, the political function of micro-decisions continues to mutate as it plays out in computational society. Accordingly, Sprenger maintains that a power analysis of computational society should operate in terms of the infrastructural re-configuration of the social "without drawing a line between human and technical actors."[97]

Paying attention to the micro-decisions shows that the smooth, continuous appearance of networked space is in fact a striated space: discontinuity—halting or redirection—occurs at every moment. Galloway argues that the site of power is also the site of resistance, and therefore as with biopower, control has spawned *counter-protological* forms of resistance. Counter-protocological resistance acts to disrupt the facade of continuity by forcing the hidden discontinuity to come to the fore. Such is the form of politics Galloway outlines in the third part of his book, where he looks at hacking, tactical media, and internet art, as well as viruses and terrorist networks. The latter are all forms of resistance that, he argues, emerge within the era of the protocol. It is clear that Galloway, like Bratton, is tied to a notion of technology that allows for action to the degree that it is ultimately designable and malleable by human beings.[98]

Galloway is without doubt correct in asserting the possibility of resistance to technological forms of power comes with a greater understanding of the material level. Alongside such an inquiry, however, it is also worthwhile studying the extent to which the automation of social

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[93] *Ibid.*
[94] *Ibid.,* p.82.
[95] Amoore, 2013. p.6.
[96] Sprenger, 2015, p.28.
[97] *Ibid.,* p.28
[98] For example, Galloway describes a "new set of social practices that inflects or otherwise diverts these protocological flows towards the goal of the utopian form of unalienated social life", and cites Hans Magnus Enzensberger's concept of "emancipated media" created by "active social actors rather than passive users." (2006, p.16).

forms and cultural life creates novel machinic worlds of signification. The study, that is, of material culture in light of the question of social meaning that does not fundamentally derive from significations produced by human psychic activity but rather from the machinic activity of computation. Is Galloway's protocological analysis enough to unveil this technical dimension of the social imaginary? And how does the relation between imagination and protocol affect the horizon of possibilities of which actions can and cannot be taken? In other words the question raised by the protocol is not simply the question of access of human individuals to other human individuals or systems. Instead my own interest in protocol focuses on the way in which automated processing of flows of data constitute the relations and interactions of a properly computational mode of *being-for-itself*. A mode of being that articulates the world through a mathematical formation of social imaginary significations. Galloway explicitly states that he is avoiding the question of artificial intelligence and speculations about consciousness and thought,[99] and while this is a valid and necessary methodological demarcation of his study, it creates an aporia in his analysis that misses a key political dimension of the social. More than ever, in computational society modes of abstraction are of political importance and narrowly materialist analyses such as Galloway's *Protocol* are insufficient. Accordingly, if the imagination is a mode of abstraction that creates the world, to what extent is that mode of abstraction commensurable with computational abstraction? In other words, what would it mean to say that the imaginary auto-institution of the social is formed through protocol?

As Seb Franklin notes, by engaging only with the material dimension of technology, governance is "generally rendered as coincidental to the function of particular apparatuses and practices",[100] rather than the fuzzier sociocultural consequences of these technologies. This is understandable considering the etymology of the concept 'control', and its historical relation to the regulation of systems. However, the equivalence of governance with computation reduces computation to a function of power. Such a view ignores the properly technical mode of existence described by Simondon in *On the Mode of Existence of Technical Objects*. Technical objects for Simondon must be studied in terms of how they engender a specific formative relation with the world. Franklin's engagement with technology is successful in this regard, as it explores the concept of control in the cultural field to make the case for the digital as an *épistémè*.[101] To do so extends the study of the artefacts of computational technologies to inquire how the cultural logic of control appears in political economy and social formation.

[99] *Op. cit.*, p.17–18.
[100] Franklin, 2015, p.xvi.
[101] Foucault, 1973.

Similar to Franklin, I wish to understand the phenomenological and ontological shift in the social imaginary caused by the extension of computation into the procedures of everyday life. My thesis is thus aligned with Franklins's project to the extent that it "is an inquiry into the ways in which certain digital conceptualisations of those phenomena [life, sociality, or the physical universe] emerge, are normalised, and function within social, political, and cultural practices."[102] Similarly, mine is an attempt to explore how these concepts emerge, by locating their emergence *within* a field that is, following Simondon, always-already sociotechnical. This mean that the technical is neither determined by the social, nor the social determined by the technical, and while techne has own mode of existence, its own logic (technical mentality), it is co-constitutive with the social.[103]

On the other hand, Franklin's project echoes Tiqqun's *Cybernetic Hypothesis*[104] (discussed below) by concentrating on the way in which control, or "steering," has become "the guiding metaphor for all human activity".[105] However, one might instead argue that technology does not nearly function as a *metaphor* for "social, cultural, and political practices," but enacts a repatterning of signification within such practices when they are technologically reconfigured and mediated by computational logics. Moreover, as will be argued in the next chapter, the introduction of interaction and learning into the technical fabric of society requires a consideration of computational reason as more than mediatic. Machine learning techniques that use ANNs, for instance, are processes by which data is transformed according to the weighting of hidden layers that have been trained on data from the world. The social world is encoded into the neural network structure in such a way that the output is not a simple function of the input. The output of an ANN has a bias that is pre-encoded in the data set. This bias is fragment of the social imaginary. However, the bias is further modified and mutated by the logical transformation of digital discretisation and compression of the continuum of the social world. This thesis seeks to analyse and evaluate the extent to which such processes constitute acts of machinic creation that could potentially reshape of the social-historical horizon of thinking, doing, and being. Rather than steering as metaphor, computation is a creative force that can and must be considered in its own right. This differs significantly from the servo-mechanic image of computation that is the target of Tiqqun's critique, to which we will now turn.

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[102] *Op. cit.*, p.xix.
[103] Simondon, 2013.
[104] Tiqqun. 2019, p.5.
[105] Franklin, 2015, p.xviii.

The Cybernetic Hypothesis

Tiqqun's essay *The Cybernetic Hypothesis* offers an analysis of cybernetics as the technopolitical and metaphysical paradigm of contemporary governance that, they argue, has come to supersede (to subsume and transcend) the dominance of liberalism.[106] For Tiqqun, cybernetics is not simply a siloed domain of production of information and communication technologies. As with Franklin's synonymous cultural logic of control, the emergence of cybernetics produced an epistemic shift in knowledge production that has reorganised the world. From cybernetics there has blossomed a "new governance mentality" for the control of the social sphere: governance through modulation.[107] This governance mentality functions through the intersection of the technique of separation (individualisation), and the technique of totalisation (normative biopolitical regulation of the population). Tiqqun term these dual techniques "the police of qualities" and the "social production of society". The blueprint for cybernetic governance is conditioned upon several technological capacities: the capture of any and all data emanating from "subjects" (mobile devices, internet browser cookies, IOT, and the digitalisation of bureaucratic data collection); the handling of that information "by correlation and association" as found in the techniques of big data analytics; and "proximity to every living community". To govern according to the cybernetic hypothesis is thus to control all the "flows of information and decisions that circulate though the social body."[108]

Cybernetic control, Tiqqun argue, is the expression of a technocratic will to bring about the "end of politics".[109] Without politics there can be no social change. Without politics, stability, and dynamic equilibrium reign, bringing about "the end of history" though scientific means.[110] To this end, cybernetics is concerned with creating order out of disorder, which it attempts to do through prediction. Computing machines, reliant only on past data, are technologies of memorisation, a form of dynamic recall that re-presents the past as aggregate probabilistic futures. This cyclical temporality of cybernetics, which forecloses the future based on past data, leads to the recreation of "the world within an infinite feedback loop" fusing the two moments of separation (data harvesting) and connection (communication networks) into an a-historical, systemic totalisation.[111] Any signification produced through differentiation is nullified within the system by its reduction to a general equivalence as a mathematical function of information

[106] Tiqqun, 2019, p.5
[107] *Ibid.,* p.7.
[108] *Ibid.*
[109] *Ibid.*
[110] *Ibid.,* p.10.
[111] *Ibid.*

circulating around a communication system. Accordingly, it would seem, the cybernetic articulation of the world has no creative dimension, it is simply *re*creative. To the extent that it articulates a world, cybernetics is the rearticulation and entrenchment of existing power dynamics and the self-replication of capital as machine. Accordingly, Tiqqun propose an insurrectionary politics against this cybernetic machine. The only response to the anti-political and a-historical cybernetic technocracy is a complete exit or destruction of the system.

To the extent that the cybernetic hypothesis is concerned with the social imaginary, it is only with the ideological intensification of existing social imaginary institutions: "For cybernetics it is no longer a question of predicting the future, but of reproducing the present."[112] Tiqqun argue that, both spatially and temporally, cybernetics constitutes a totalitarian system driven by a core mission of "endlessly restoring the integrity of the whole".[113] It is a social experiment that treats society as a superorganism; the totality of society becoming an experiment in integration and control.

This dynamic of control is a predisposition of capitalist cybernetics, Tiqqun explain, which developed first as bureaucracy in the late nineteenth century and found further expression with the advent of mechanical computation in the twentieth century: "After 1945, cybernetics supplied capitalism with a new infrastructure of machines—computers—and above all with an intellectual technology that permitted the regulation of the circulation of flows within society, and making those flows *exclusively commodity flows*." The cybernetic regulation of the flow of information for the purposes of capital accumulation using this "intellectual technology" means that valorisation now takes place beyond the confines of the traditional sphere of production.[114] As Mulgan maintains, "sociability has taken on an economic value in the era of post-Fordism".[115] Social media platforms like Facebook are prime examples of this valorisation of sociability, tracking and labelling users as more or less valuable depending on their frequency of interaction on the platform, size of network influence, income levels, and a whole range of other personal data.[116] Due to this fact, Tiqqun propose that political gestures, such as the union strike, must take place outside of the sphere of production so as to also disrupt and sabotage the circulation of products and information.[117] Unlike Toni Negri and the autonomist Marxists, Tiqqun do not see an emancipatory potential in the "general intellect", because the intellectual "cognitive"

[112] *Ibid.,* p.15.
[113] *Ibid.,* p.12.
[114] Dixon, 2013.
[115] Mulgan, 1989.
[116] Skeggs and Yuill, 2019.
[117] Tiqqun, 2019, p.30.

production of the proletariat only serves to provide the cybernetic machine with more information. For them, the flows need to be halted though sabotage, and information must be withheld by refusing and retreating from these flows. By reducing computation to the cybernetic model of governance, Tiqqun do not allow for any possibility of a praxis that engages with computation beyond sabotage and retreat.[118] While such a proposition has its strategic merits in the long-term, the question remains open as to whether tactics of sabotage are even a possibility. The totalising tendency that Tiqqun point to is certainly clear considering the increasing capture by computational reason of the cognitive-informational dimension of social life, as well as the imaginative creative ground from which it springs (which Castoriadis calls the radical imagination). Nevertheless, while there may be a tendency to totalisation, Tiqqun's complete equivalence of the economic, ideological, and technical spheres of capital is a fatalism based on an overly deterministic model of technology.

Contrary to Tiqqun's diagnosis, my argument that there is a machinic imaginary proposes that, with the advent of the interactive paradigm of computing (explained below), there *is* in fact a creative or imaginative aspect of computational reason that has a non-deterministic effect of opening the "cybernetic system" to the possibility of differentiation. The theory of the machinic imaginary proposes that there is a socio-technical dynamic of self-differentiation. It follows that if the machinic imaginary constitutes a new creative force within social-historical becoming, this requires a total reorientation of the politics of the sort Tiqqun advocate. That is, rather than the cybernetic hypothesis constituting the end of politics, there is in fact an inherent politics to computational society. The political site of contestation is reached through an interrogation and critique of the creative dynamics of machine intelligence in socio-cultural production. Software studies, for example, is a field of inquiry which is particularly competent at interrogating the messy overlapping dynamics of human and machine cultural production. The most effective research projects are those that focus on the more invisible and ostensibly banal ways in which computational reason seeps into everyday thinking and doing. Interrogation of the computationally-driven institution of the social imaginary is an important site of intervention precisely because of the increasing domination of all domains of individual and collective life in the twenty-first century. Tiqqun's techno-determinist fatalism dissuades them from tactics of seeking points of divergence and attempting to rearticulate the computational imaginary otherwise than the image presented by the cybernetic hypothesis.

That being said, there is certainly a lot to take from Tiqqun's criticism of the cybernetic

[118] *Ibid.,* p.41.

hypothesis: the relation between cybernetics, capital, and the military industrial complex; the cybernetic recuperation of progressive, ecological, socialist, and communist ideals into the very functioning of the system; the extension of "the principles of control and management from administrative bureaucracy" beyond the "Providential State" into civil society;[119] and the dual tendencies of separation and totalisation of cybernetic capital. Crucially, what can be inferred from Tiqqun's text is the organisation of the social imaginary according to the social imaginary significations of the cybernetic hypothesis. Cybernetic rationality is, in relation to the social imaginary, a primary social imaginary institution that organises all other imaginary significations according to its logic. This is why, Tiqqun argue, ecology and socialism have thus far been unsuccessful in escaping the cybernetic hypothesis. The imaginaries they create were built upon the imaginary institution of cybernetics. In these terms, Tiqqun's solution—the politics they present as the only possibility—makes sense. Sabotage and refusal may be necessary to break the stranglehold of the cybernetic hypothesis on the social imaginary because the social imaginary is instituted through action and material processes, just as much as through thinking and ideational critique. The historical development of learning in machines outlined in Chapters Five and Six should therefore be read as taking place within the context of capitalism and (what Tiqqun call) the cybernetic hypothesis. This historical analysis will facilitate an attempt to describe the matrix computational processes that compose *the logics of the machinic imaginary*. However, in contrast with Tiqqun, the conclusion to the analysis will point to a different political problematic that is only explicitly discernible from the standpoint of post-phenomenological methodology—even while it is perhaps implicit in Tiqqun's critique. That is, that in attempting to interrogate the machinic dimension of the social imaginary one must first come to terms with the fragmentation of the imaginary into mutually incomprehensible orders. The machinic imaginary, it will be shown, is a non-human subtenancy of the creative auto-institution of the social-historical world. This is an important and generative problematic for any politics that centres around the notion of political autonomy in the creation of world, as can be found in Tiqqun as well as Castoriadis.

Autonomy, Automation, and Subjectivity

The notion of autonomy is a point of intersection between Tiqqun's analysis and the notion of praxis developed by Castoriadis. At the heart of Tiqqun's politics of refusal and sabotage is an argument for an autonomy that refuses totalisation by the cybernetic imaginary:

> The autonomy I'm talking about isn't temporary nor simply defensive. It is not a

[119] *Ibid.,* p.40.

> substantial quality of beings, but the very condition of their becoming/future. It doesn't leave the supposed unity of the Subject, but engenders multiplicities. It does not attack merely the sedentary forms of power, like the State, and then skim over the circulating, "mobile", "flexible" forms. It gives itself the means of lasting and of moving from place to place, means of withdrawing as well as attacking, opening itself up as well as closing itself off, connecting mute bodies as bodiless voices. It sees this alternation as the result of an endless experimentation. "Autonomy" means that we make *the worlds that we are grow*.[120]

Autonomy is a space of creation so intense that it cannot be recuperated by the cybernetic impulse. Tiqqun's notion of autonomy—and the politics of creation they advocate—has certain similarities with Castoriadis' notion of autonomy.[121] Castoriadis understands autonomy as the capacity of thought and action "to break the closure within which it has hitherto existed." He argues that this is achievable only through a praxis of relentless interrogation of the imaginary institutions that produce the world.[122] He rallies against totality and determination by instituted logics, insisting that the social imaginary is radically open to the incompleteness of being;[123] the incompleteness of being that one finds when one enters the labyrinth of imaginary significations that make up the world. Praxis is, for Castoriadis, precisely that continual experimentation which, Tiqqun maintain, "will become the 'fecund chaos', communism, the end of the cybernetic hypothesis."[124]

Nevertheless, what both Tiqqun and Castoriadis exclude from their models of autonomy are the modes of subjectivity immanent to computational processes themselves. Arguably, this is potentially a fundamental problematic with the very concept of autonomy, considering it stems from the modern conception of the subject as a self-determining autonomous agent. The difference, however, between Castoriadis and Tiqqun's conceptions of subjectivity, and their corollary strategies for autonomy, highlights the extent to which Castoriadis's thinking is much more open to an incorporation of the machinic imaginary than Tiqqun could ever be. This is partly because Castoriadis avoids the "egological" ontology of the subject though his psychoanalytic conception of subjectivity. Subjectivity for Castoriadis is radically conditioned by

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[120] *Ibid.,* p.51 [emphasis in original].
[121] This is in spite the fact that Tiqqun deride Castoriadis as one of the thinkers of the twentieth-century who critically embraced cybernetic thinking. Their criticism presumably refers to his debate with Francisco Varela about the concept of *autopoiesis*. In fact, Castoriadis was an ardent critic of rational mastery, which is at the core of the cybernetic impulse. For his explicit references to cybernetic thinking and its relation to capitalism see Castoriadis, 1984, p.222–223; and Castoriadis, 1991b. pp.187–188.
[122] Castoriadis, 1997d. p.340.
[123] Or what Reza Negarestani calls the "open continuum" in Negarestani, 2011.
[124] Tiqqun, 2019, p.51.

the reciprocal interplay of the dynamics of psychic and social imagination.[125] Tiqqun, on the other hand, seem to propose a return to the individual subject against the cybernetic disaggregation of the individual into "Risk dividuals" (a term borrowed from Deleuze's *Society of Control*).[126] However, this reassertion of the subject—through the refusal of the cybernetic process of subjectification—is an overly voluntaristic refusal of the inevitability of the social. The radically social dimension of subject formation discussed by Castoriadis highlights the need to interrogate the subject as always in relation to the social imaginary. Castoriadis' account of subject formation is a psycho-social theory of immanence. It starts from the recognition that there is no extra-social space from which an individual or collective can think or act.[127] My argument is that the social imaginary is technologically co-constituted by a machinic mode of being that diverges from the creative capacities of human psychic creation. This extra dynamic of the social imaginary requires attention if we are to truly understand the capacities of the subject to act in and on the world. Such interrogative activity is a praxis, in the sense that Castoriadis uses the term. As will be discussed in the next section, this praxis is the ongoing process of reflective interrogation of society. Chapters Two and Three develop a post-phenomenological framework to open such reflective interrogation to other processes of creation, other subjective subtendencies in the social (machinic or otherwise), that do not centre around an anthropocentric psycho-social relation.

Tiqqun's anthropocentric notion of subjectivity leads to a mutual exclusivity between human being and machinic subjective tendencies, stemming from a particular understanding of computation based on a somewhat outdated classical cybernetic model. This seems to be the case with a lot of theories of computational society, particularly those that were written before the explosion of machine learning in the past few years. The servo-mechanic model of computation derived from twentieth-century cybernetics is outdated because the Turing machine model of computing has been replaced in the past few decades by a dynamic automation that can no longer be described as functioning through sheer mechanical repetition.[128] A humanism set against servo-mechanic machines is theoretically inadequate for comprehending the paradigmatic shift to the dynamic interactivity of online, distributed machine learning and big data.

With the interactive paradigm of computation there is a shift in emphasis from algorithmic

[125] Castoriadis, 1987. We might update Castoriadis' model of the psyche-social relation though an engagement with contemporary neuroscience of the sort proposed by Gruber, 2019.
[126] Deleuze, 1990b.
[127] Hence Tiqqun's criticism that he is a cybernetic thinker.
[128] Parisi, 2018. See also: Longo, 1999.

determinism as a functional transformation of outputs from inputs, towards an interactive non-determinism consisting of dynamic streams of time-dependent inputs. Future inputs are dependent on the values of previous outputs of the model, which introduces a dynamic of change within computation.[129] Moreover, computational systems today are fully wired into the social fabric, computational society is not just the digitalisation of culture, but culturalisation of computers. As Parisi explains: "The cybernetic network of communication has not only absorbed physical and cognitive labour into its circuits of reproduction, but is, more importantly, learning from human culture, through the data analysis of behaviours, the contextual use of content and the sourcing of knowledge."[130] Data is no longer static, it is produced by the activities of other agents in the environment, including humans, other machine processes, and the physical environment. Computational processes take place in real-time, distributed across networks, augmented by massively parallel computing architectures.

Each of these components of the current computational paradigm point towards the idea of a machinic imaginary. The machinic imaginary is a subjective subtendancy of the social. Its formation is embedded in a social setting, much like the psycho-social relation in Castoriadis' theory of subject formation mentioned above. The time-dependency of interactive computing is also fundamental, pointing towards the generative nature of machine processing of the social world. Recursive iteration is a core component of learning, generalisable beyond the micro-level of the computer model (such as machine learning techniques). The concurrency of interaction between computations and ongoing environmental processes external to the computational model also produces a historicity in large-scale machinic ecologies (see Chapter Six).[131]

Luciana Parisi has argued extensively for the need to comprehend the "alien subjectivity" of this dynamic, interactive form of automated computational reason.[132] This alien subjectivity is the outcome of an ontogenetic evolution of techne, that has subsumed computational mathematical-logic (theoretical reason) into the machine (*techne*). Parisi's insight is that the instantiation of logic into the technical medium of the computer has led to an evolution of logic. The mechanisation of computation and its social implementation is the transformation, or synthesis, of theoretical reason (hypothetical, or evaluative and predictive, reasoning) into practical reasoning (normative reason/deliberation about action). This synthesis can be seen in

[129] Goldin, Smolka, and Wegner, 2006, pp.vii–viii.
[130] Parisi, 2019a, p.29.
[131] As Fuller has demonstrated by drawing the connection between Turing's machine and Luitzen Egbertus Jan Brouwer's constructive (time-dependent) mathematics, computation has always been a process occurring over time. With the turn to interaction, this temporality becomes a historical process by inscribing itself though the transformation of the social world. Fuller, 2014, p.94.
[132] Parisi, 2019a.

role of predictive analytics, which is at the heart of the majority of today's complex automated computational systems, examples being machine vision, natural language processing, or simulation and modelling. This *computational* logic is unlike previous articulations of logic understood as theoretical reason. Computational logic has evolved through its practical application in computational machines as the synthesis of theoretical and practical reason.[133] Theoretical and practical reason come together in contemporary culture in the medium of the computer, as Parisi maintains: "This conflation of media and automated models of reasoning crucially revealed that embedding logic into media made this logic different."[134] It is therefore, from an ontogenic perspective, a new mode of thought in the world. This new mode of thought, I will argue, contains a capacity to articulate a world-for-itself. This flies in the face of Heidegger's proclamation that cybernetics marks the end of metaphysics, or critical theory's critique of the irrationality of instrumental reason.[135] Rather than instrumental reason reproducing the same, this is an inhuman reason.

The development of computation towards interaction created a demand for new forms of logic able to compute incomplete data sets, as computing started folding the informational environment of data streams into its processing. Responding to this problem space, computer science began shifting from symbolic manipulation towards research on inferential recursive logic (from deductive to abductive reasoning). This new computational logic would be able to make inferences based on incomplete data, i.e. treat non-totalising data sets as if they were complete. Most importantly, however, recursive inferential reasoning is revisionable, iterative, and evolving, and with it a new temporal dimension has been introduced into computational logic (for example, ANNs, as discussed in Part II). With this, the possibility of novelty emerging out of iteration requires consideration. Rather than computers acting as atemporal instrumental media, computation within the interactive paradigm is truly evolutive in co-constitution with social-historical being, and therefore neither fully determined by nor determining of the social.

From a post-phenomenological perspective, the question arises as to how this alien subjectivity articulates a world-for-itself. What world does it create for itself as it abstracts and orders social-historical being? What machinic imaginary significations constitute such a world, and how might they differ from human-biological imaginary significations? What happens to our model of the social if we posit such a bifurcation of modes of social imaginary significations (human and machine)? Which is to ask what this speculative-spectral existence of machinic significations

[133] Parisi, 2019b.
[134] *Ibid.,* p.8.
[135] Heidegger, 1993b.; Horkheimer, 1974, p.97–105.

means for a conception of the social imaginary in the twenty-first century. A transformative praxis that is a match for a computational society within which theoretical and practical reason are enfolded in the machine, *must therefore be a praxis that itself transverses action and abstraction*. To approach these questions, we will now turn to a summary of the synthesis of critical theory and world-articulation, including a first detailed pass through the philosophy of Castoriadis.

Reflective Articulation and Critique

The over-determination of governmentality in the study of technological systems-dynamics is a prevalent feature of contemporary media theory and philosophy of technology. As argued above, this simply reinscribes sovereignty into technology, limiting the range of responses to the contemporary mediatic condition. Both Bratton's politics of design and Tiqqun's politics of sabotage are both responses predicated upon a political analysis of forms of governmentality in which sovereign power is replaced by the automation of the micro-physics of power (control). The analytical overdetermination of governmentality can be countered, however, by turning to the domain of meaning and signification through the theory of world-articulation.

Addressed through the lens of the social imaginary, a turn to world-articulation as regards computational society leads to a string of questions with decidedly political implications: What has become of the phenomenological notion of 'world' in light of twenty-first century technology? To what extent is it analytically correct to describe the imaginary of computational society as a single unified world, i.e. is the social imaginary a singular world or a plurality of worlds? What worlds are possible within the social imaginary? *Are* other worlds possible, and if so, how might they be articulated? What role does signification play in the production of social worlds?

The implications of these questions are crucial for a theory of praxis if we consider the possible existence of a machinic imaginary (or, even if one considers a weaker version of the thesis that there has been an automation of social reproduction). How can action oriented towards changing society be possible if the very terms by which meaning and thought are produced (i.e. the social imaginary) have become automated? And moreover, how do we understand these automations within the analytic framework of subjectivity? Approaching this though notions of subjectivity and world articulation allows a shift in the discourse around technology. From the analysis and critique of governance, the focus shifts to a praxis of technopolitics based on reflective articulation of norms. Through a post-phenomenological lens, the question of

technology becomes a question of engaging with the production of norms in the activity and abstractions of the full array of subjective subtendencies present in society, including machines.

Kompridis on Reflective Disclosure and Critical Theory

As many have argued, the crisis-focused cultural tradition produced by modernity's critical reflectiveness has brought about the ever-urgent inquiry into the continuities and discontinuities between the past, present, and future that pervade politics and critique.[136] This has in turn led to the compulsion towards future-orientation not only in thought but also in social practice, as attested to by the expansive discourse on risk.[137] This is evident in a reflection on the temporal dimension of computational media, the dominant temporal mode of computational society being that of the future.[138] This futural condition is produced through a *predictive* process inferring the future through analysis of the past (data).[139] The characteristically modern embrace of the future on a pathological scale is reflected in the abundance of predictive technologies ranging from predictive text and predictive take-away ordering, to automatic energy regulation in 'smart' buildings, and weather predicting probes. Prediction is at the heart of machine learning models used in financial asset management, as well as large-scale projects like the United Nations/Microsoft collaboration "The Madingley Model", which is designed "to help inform decision-makers about the impacts of their choices on biodiversity and ecosystem services."[140]

In his book *Critique and Disclosure*, Kompridis begins with a problematic that seems ever more pertinent in the age of predictive technology:

> How does our culture open itself to the future? How does our openness to the future render intelligible (or unintelligible) the ever-shifting constellation of relationships between past, present, and future? Are there better or worse ways to be open to the future—better or worse ways to be open to something new?[141]

One could argue that the normative dimension of culture is maintained and mediated by the technological infrastructure driven by predicative logic, and that a future-orientation of activity is the quotidian mode of mediated experience in computational society. It is within this context

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[136] Kompridis, 2006, pp.3–8.
For further discussion on the topic of crisis, critique and modernity see: Koselleck, 1988; or Cordero, 2016.
[137] Beck, 1992. Suhail Malik (2019) demonstrates the persistence of the futural in modernity through a critique of the concept of the "contemporary".
[138] Beckert, 2016.
[139] Amoore, 2013; Goede, 2012.
[140] See: https://madingley.github.io/
[141] Kompridis, 2006, p.9.

that this thesis searches for a deeper understanding of the crisis of the future *qua* imaginaries in computational society. In response to the capture of the future by capital, transformative politics calls for a "proliferation of alternative futures".[142] Transformative political practice and theory driven by the same modern relation to the future. The emphasis on imagination, creativity, and a transformation of norms provides a countervailing tendency to the drive for prediction that emerges from the capitalist drive for profit. Either way, the cultural logic of the relation to the future elicits a responsive attitude. Kompridis locates this responsive attitude in the concerns of "world disclosure" theory.[143]

The critical dimension of world disclosure is concerned with the way in which we "renew our cultural traditions, transform our social practices and political institutions, when they break down or are challenged in such a way as to preclude going on as before."[144] This is the core philosophical and political question of "crisis thinkers", and has an urgency today with the rise of neofascist movements, anti-democratic populism, continued Western imperialism, and climate breakdown. As Kompridis rightly maintains, there is a "need to rethink our commitments to certain ideals and practices, perhaps to break free of them, by imagining previously untried or uncovering previously suppressed possibilities. This particular need is the need to begin anew—a need marking one's time as a time of need."[145]

Kompridis probes the intrinsic link between modernity as a critical project of "reflectiveness" (in Bernard Williams's sense) and the crisis this generates.[146] He does so, however, through an engagement with world disclosure, synthesising the two discourses into a notion of reflective disclosure:

> Though reflectiveness irreversibly defines our relation to our cultural traditions and forms of life, it does not exhaust that relation. It is therefore important to resist the long-standing appeal of one or the other of these two extremes: thinking of ourselves either as standing completely outside of our traditions or…as identical with our traditions. [….] Both of these influential positions are illusory, offering either too much reflective distance or not enough. Traditions, forms of life, call them what you will, are repositories of cultural learning; they bare and transmit an ensemble of holistically

[142] Lovink and Rossiter, 2018, p.130.
[143] Kompridis own project is itself situated within the discourse concerning modernity and the future as a problematic for critical theory concerning its own future, "the cultural role of philosophy and the nature of critical theory's 'calling'" and the "normative implications of modernity's relation to time". Kompridis' argument is that the concept of world disclosure has the potential to renew critical theory and open it to its own future.
[144] Kompridis, 2006, p.3.
[145] *Ibid.,* p.3.
[146] Williams, 1985.

> structured meanings, ideals, norms, and practices, providing the interpretative and evaluative schemes in terms of which we take upon relations to the world and to one another. The success of any attempt to transcend the limitations of our traditions and forms of life, to surpass their horizons of meaning, will depend on insight, and the acquisition of any such insight will depend crucially (though not exclusively) on the semantic and cultural resources preserved within them.[147]

In this existential situation of always-already finding ourselves in a world of meaning that defines our capacity to act and think, simultaneously attempting to act and think otherwise is the fulcrum of world disclosure as critique. Kompridis outlines two modes of disclosure: the pre-reflective disclosure of the world is the disclosure of "the background structures or conditions of intelligibility necessary for any world- or self-understanding."[148] Pre-reflective disclosure describes the phenomenological lifeworld (*Lebenswelt*) of socio-cultural meaning into which we are thrown: language, code, social-relations, historical narratives, myth, and the material contingencies of embodied spatiotemporal existence.[149] Reflective disclosure, or redisclosure, is the active relation and interpretation of the world. Reflective disclosure describes the "the ways in which these background structures of intelligibility are reopened and transformed through novel interpretations and cultural practices"[150] Both modes of disclosure suppose human receptivity, it is not a case of non-cognitive verses cognitive processes but rather the degree of awareness involved in the disclosure. Accordingly, Kompridis' philosophical inquiry aims "to understand the interactive relation between pre-reflective and reflective disclosure". He argues that the relation between the different modes of disclosure "must be understood both as a feedback and as an oppositional relation." This circular relation of "disclosure is an ongoing process: it is always happening 24/7."[151]

In this theoretical tradition of world disclosure, Kompridis locates an approach to change and the new. Hannah Arendt's concept of 'nativity' is here held as an example, as is Castoriadis' "attempt to reformulate Heidegger's view of disclosure as a basic concept of social and political theory."[152] Kompridis invites us to dwell on the everyday practices and abstractions of the social world already disclosed to us, in order to foster an open relation to the new. Kompridis posits

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147 Kompridis, 2006, p.7.
148 *Ibid.,* p.34.
149 Kompridis develops the notion of reflective disclosure from the phenomenological writings of Martin Heidegger. In the 'existential analytic' of *Being and Time* (2013), Heidegger describes a pre-given and grammatically structured background/world into which we are 'thrown'.
150 *Ibid.*
151 *Ibid.*
152 *Ibid.,* p.194.

that an active receptivity is required to encounter and create the new. Receptivity, he argues, is prior to creativity.

Receptivity is also what Isabelle Stengers is calling for when she explains that Whitehead's philosophy highlights our duty to "take care of our abstractions" by posing the questions "What are our modes of abstraction doing to us? What are they blinding us against?"[153] To use Kompridis' Heideggerian language, the world is pre-reflectively disclosed to us through the abstractions that mediate our experiences and relations to one another. As Stengers writes: "We cannot think without abstractions: they cause us to think, they lure our feelings and affects."[154] Reflective disclosure, therefore, necessarily proceeds through a receptivity to given abstractions, through an openness to engaging with how our abstractions create the world we inhabit. Castoriadis, likewise, rallies us to interrogate the social imaginary significations that institute the world. The creative praxis that is required to transform the world must start by elucidating the already-articulated meaning of the world. Creating new meaningful relationships to the world and to ourselves cannot start from a universal nowhere, the institution of novel social imaginary significations takes place within an already-instituted social imaginary. Consideration of the already-instituted social imaginaries—the forms of life and abstractions passed on to us—is necessary to develop what Kompridis calls "cooperative, accountable practices of reflective disclosure."[155]

A praxis of reflective disclosure, or better *articulation*,[156] is therefore a collective endeavour because it is always socially-situated, it is always an engagement with the social imaginary that conditions the possibility of thinking and doing in the first place. Kompridis highlights the inescapable sociality of praxis, arguing that any transformative articulation of the world requires us "to think of human beings as cooperative facilitators rather than as heroic creators".[157] The machinic imaginary, therefore, presents an interesting site of inquiry for any attempt to develop a critical theory of reflective disclosure. Twenty-First century media systems are on the one hand a primary representational mode through which the world is pre-reflectively disclosed. However, the ever-more dynamic processes driving this mediation also constitute a rearticulation of the world in manner alien to the normative sources of critical theory. How reflective disclosure—or

[153] Stengers, 2008, p.50
[154] *Ibid.*
[155] Kompridis, 2006, p.202.
[156] Moving from Kompridis' Heideggerian-inspired theory of disclosure to a post-phenomenological critique will be accompanied by a shift in terminology from disclosure to articulation and expression. The theoretical rational for this will be become clear in the Chapter Three. Most simply, however, it is to distinguish the post-phenomenological methodology—derived from a more Merleau-Pontian phenomenology—from the array of phenomenological approaches to technology that derive from a Heidegger quite different to the Heidegger described by Kompridis.
[157] *Ibid.*, p.203.

the creative praxis advocated by Castoriadis—engages with this alien form of reason must originate from a receptivity that is open to a pluralist notion of reason.

Kompridis suggests that a successful renewal of critical theory depends "on the possibility of an enlarged and pluralistic conception of reason".[158] He recognises that different forms of reason, through which the world is disclosed or articulated, cannot be subsumed under a monotheistic reason (Habermas' proceduralism being the main target of his critique but this of course has broader application in that proceduralism is an indication of a certain liberal attitude to politics and normativity). However, there is no indication that Kompridis is referring to computational reason as a different form of reason—the examples of technology he discusses are very much embedded in a Heideggerian idea of modern industrial technology, such as bioengineering. Nevertheless, his reference to "local worlds" as "plural understandings of being not subsumable under a single understanding of being", points in a direction that is not closed to thinking about computational reason as form of world articulation. This same pluralist attitude to reason is found in Castoriadis, who develops his position through a critical interrogation of the social-historical institution of reason in Western metaphysics. His philosophy of the social imaginary is a political development of world disclosure that, I argue, is a productive and useful analytical framework to uncover and explore the problems reflective disclosure faces in computational society.

Castoriadis and the Social Imaginary: A Theory of Praxis

In the *Imaginary Institution of Society* (*IIS*), Castoriadis reasserts the break with Marxism that he first initiated in the libertarian socialist journal *Socialisme ou Barbarie* (*SouB*).[159] Previously in this journal, published between 1948 and 1967, Castoriadis (along with Claude Lefort and others) undertook an analysis of the bureaucratic tendencies of Soviet Union and China, as well as the liberal capitalism in the west. Castoriadis saw the inability of Marxist theory of the time to correctly analyse this bureaucratic domination as a failure of its ability to evolve as a theoretical framework through which to understand historical change. In response he developed a systematic critique of Marxism, targeting the inherent rationalism of its theory of history.[160] The

[158] *Ibid.*, p.223.
[159] S*ouB* was a journal and libertarian socialist organisation co-founded by Castoriadis and Lefort. Other members and contributors included Lyotard and Edgar Morin.
[160] It is of note that there are significant parallels to Merleau-Ponty's theory of history, which he proposed as a corrective to the Marxist theories of history of Georg Lukács and Jean-Paul Sartre. (See Merleau-Ponty's *Adventures of the Dialectic* (1973), and *Institution and Passivity* (2010)). Merleau-Ponty's emphasis on the generative becoming of history and his concept of "institution" were an influence on Castoriadis' terminology by the time of *IIS*. However, while Merleau-Ponty gradually shifted towards a position he descried as "new liberalism", Castoriadis political

problem Castoriadis saw in Marxist historical materialism was an unavoidable determinism inherited from Hegel's idealism, and the ontological tradition of Western philosophy in general. Castoriadis critiques Marx's analysis for its occultation of the real activity of human beings, by ultimately erring towards an overly utilitarian technological and economic determinism.[161] The rational mastery implied by the modern notion of progress stemming from an ever-expanding scientific and technological sphere is contradictory to the idea that the revolutionary praxis of the proletariat drives history.[162] It is this latter kernel of Marxist thought that Castoriadis wished to save from the teleological inevitability of communism arising from the rationalist tendencies of capitalism.[163] By turning to the radical creativity of the social imaginary for a conception of social transformation, Castoriadis was attempting to simultaneously understand how history is generated, and how that generation is predicated upon the historical sedimentation or "institution" of thought and action into a social imaginary.[164]

Rallying against all forms of determinism Castoriadis moved to a process-relational ontology of society and history that could adequately describe the radical indeterminacy and creativity of what he called the social-historical mode of being.[165] In *IIS*, he insists that a truly revolutionary project requires an ongoing praxis centred around the critique and rearticulation of the "imaginary institution of society". The concept of the social imaginary is thus central to his theory of praxis, which is aimed at uniting thinking and doing in the creative process of world creation. This renewed notion of *praxis* aims to overcome the theory-praxis distinction in order to converge action and abstraction as continuous with one another in the creation of the social imaginary.

Social imaginary significations are the creative element of society, they are the dimension of society concerned with meaning and meaning-making. It is therefore only through reflection on, or interrogation of social imaginary significations—through which the social imaginary is instituted—that it is possible to extend the range of possibilities for thinking and acting in the world, as Kompridis also argues. An autonomous society is a society driven by an awareness of its own self-creation. The difference between a truly autonomous society predicated upon a

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direction tended towards a form of radical democracy, which he referred to as "autonomy". The significance of Merleau-Ponty's influence on Castoriadis will be discussed in the next chapter.

[161] Castoriadis provides a detailed and rich critique of the law of value in a 1975 essay titled: 'Value, equality, justice politics: from Marx to Aristotle and from Aristotle to Ourselves' (Castoriadis, C. 1984b).

[162] Papadimitropoulos, 2018.

[163] Castoriadis, 1988, pp.45-46.

[164] Thus while in agreement with Lukács that the objective nature of reality is the materialisation of subjectivity through the activity of labour, Castoriadis rejects the rationalist Kantian subject as the model for subjectivity in favour of a psychoanalytic model of subjectivity.

[165] Castoriadis, 1987, p.273.

reflective articulation of itself and currently existing and historical societies hitherto is that the former is self-regulating from a position of genuine reflexivity. The latter, which Castoriadis terms "heteronomous society", still creates itself, but it regulates its own creation in relation to an extra-social legislating force (God, Nature, Reason, the laws of History, the laws of the ancestors), and therefore enacts an occultation of its own power to self-institute.[166] Realisation of the self-generative nature of the social world is foundational for a praxis of reflective articulation. However, the processes through which the social generates itself now includes a further degree of complexity with the culturalisation of computers and the computerisation of culture, which I am here calling the machinic imaginary. I will return to an examination of social imaginary significations in Chapter Four to explain the creative capacity of the machinic imaginary.

Imaginary institutions of society are the webs of significations that provide meaning orienting action, and are in turn (re)created by that same social activity. The institution of the social imaginary is a world-making or world-articulating process of social-historical becoming. The instituted social imaginary is a world of meaning within which action has a context. Another way to say this is that action is *expressive* and inherently meaningful.[167] The relation between the processes of institution and the existence of the instituted social imaginary is not a relation of identity but mutual conditioning. A central claim made by Castoriadis is that the institution of the social imaginary is a creative process that brings a world into existence. However, the condition of possibility for the creative institution of society is instituted society, i.e. the social imaginary contains within it the potential for self-differentiation.

Castoriadis's concept of institution was developed from Durkheim and Merleau-Ponty. The latter influence is of particular pertinence to this thesis because institution was Merleau-Ponty's attempt to provide an alternative to the idea of constitution found in Kant and Husserl philosophies of consciousness.[168] Institution, in Merleau-Ponty's terminology is aimed at pointing to the duration of meaning as an ongoing experience that can be integrated into a historical trajectory and intersubjectively experienced.[169] A more detailed exposition of the

[166] *Ibid.*, p.372.
[167] An analogous theory of praxis is the notion of "communicative praxis", set out by Calvin O. Schrag (Schrag, Ramsey and Miller, 2003, p.20), "in which communication qualifies praxis—is even an intrinsic qualification of praxis, in that it provides the context for the very understanding of the meaning of what goes on in human action. When you link communication and praxis you now have a social form that provides the context for specific acts." Castoriadis' notion of praxis implies the social dimension because it is located ontologically within the social imaginary, meaning that action is enabled by the (instituted) social context of meaning, while also creating (instituting) new contextual meaning.
[168] Árnason, 2014a, pp.101–106.
[169] Merleau-Ponty, 2010, pp.76–77.

relation to Merleau-Ponty is covered in Chapter Three, in which the concept of "transsubjectivity" is introduced and developed to account for a process of institution that includes machinic subjective tendencies across historical horizons.[170]

As a form of reflective disclosure in the sense that Kompridis outlines, Castoriadis' theory of the social imaginary is an attempt to develop a praxis that can interrogate the pre-existing normative structures, concerns, and relations that condition all action and abstraction. Castoriadis refers to the existing world as an "instituted social imaginary". The concept of the social imaginary is Castoriadis' way of describing the *existential* field of meaning that holds together a social world, i.e. it is a social ontology. The social imaginary is radically self-generative (autopoietic).[171] It is an ontogenetic creation of a mode of being *for-itself*, which he terms "the social-historical".[172] The emergence of social-historical becoming is a historical rupture within being. The social-historical denotes "the emergence of another level and another mode of being, and nothing exists as social-historical which is not signification, caught up in and referred to as an instituted world of significations."[173] It is a mode of being within which we find "the emergence of radical otherness, immanent creation, non-trivial novelty", and genuine destruction.[174]

As a conceptual tool, the radically creative character of social-historical becoming is central to the ontological move Castoriadis designed to get beyond the rationalist theory of history found in Marxism and modernity more generally. Castoriadis' critique of reason aims to highlight the limitations of Western ontology for describing the creative dimension of human societies. The radical creativity of the social imaginary, he argues, is not describable with the standard ensemblistic-identitarian logic ('ensidic' for short) found at the root of the "inherited ontological tradition". Ensidic logic entails the problem of identity, and the necessary insistence of the determination of beings as closed sets. This is exemplified by Georg Cantor's fundamental (or so-called 'naïve') set theory defined as follows: "A set is a collection into a whole of definite and distinct objects of our intuition or of our thought. These objects are called the elements of the set."[175] This, of course, is the common problematic against which all process philosophy is built: that to 'be' is to be determinable; for something to exist it must be determined in itself and be determinable in thought. Consequently, being in the general sense is fully determined, ensidic

[170] Merleau-Ponty, 2003, p.124. See also: Árnason, 2014a, p.103.
[171] Castoriadis, 1990.
[172] Castoriadis, C. 1997e. "The State of the Subject Today". In *World in Fragments: Writings on Politics, Society, Psychoanalysis, and the Imagination* (trans. D.A. Curtis). Stanford, CA: Stanford University Press, p.143.
[173] Castoriadis, 1987, p.354.
[174] Castoriadis, 1987, 184.
[175] Cantor, 1895, p.481, cited in Castoriadis, 1987, p.223.

logic sides with Parmenides: no change is possible, and imagination, that is, the creation *ex nihilo* of significations (or *eidè*) is relegated to a secondary status, or even worse, is banished along with the Heraclitan flux.

Nevertheless, to say that ensidic logic is determining—to draw attention to its inadequacies in describing the radical indeterminacy of being—does not mean to say it can be entirely disregarded. Society would not exist if we did not have the capacity to name things, to distinguish-choose-posit-assemble-count-speak, which he calls *legein* (the root word in Greek for logos). *Legein* is coupled with the other fundamental capacity to assemble-adjust-fabricate-construct, which he calls *teukhein* or 'social doing' (the Greek root for techne). *Legein* and *teukhein* make social signification possible as proto-institutions. They are not the primary social significations, however. What Castoriadis calls "primary social significations" are significations from which all other significations of the world of that society are ordered (such as God, the State, the economy, etc.). *Legein* and *teukhein* are the condition of possibility through which the social imaginary is able to institute the world as a world.

These two universal and basic elements from which the social-historical mode of being institutes itself, speaks to a deeper point Castoriadis is making about the nature of existence. Being may be *indeterminate*, but not in its entirety, for it is also *determinable*. Castoriadis describes the mode of being that exists prior to, and predicative of identitary or ensemblist logic as a "*magma*", out of which *ensidic logic* is able to bring forth an indefinite series of determinations.[176] In Simondon we find a similar concept of the pre-individual, which is more than a unity and more than an identity, a metastable system or virtual realm of inexhaustible potential organisations. Similarly, a magma is a pre-differentiated mode of being "from which one can extract (or in which one can construct) an indefinite number of ensemblist organizations but which can never be reconstituted (ideally) by a (finite or infinite) ensemblist composition of these organizations."[177] Accordingly, ensidic logic can only ever partially describe the social-historical because it is a magma of imaginary significations, hence the profusion of an unavoidable determinism in theories of history and society.

Nevertheless, Castoriadis's critique of rationalism is not a call for irrationalism. It is an interrogation of the set-theoretical/ensidic logic according to which the social imaginary organises itself, it is the logic at work in language, in science, and all social practices that name things as distinct from other things. However, the inadequacy of set-theoretical logic is as an

[176] Castoriadis, 1987, p.343.
[177] Castoriadis, 1987, p.343. We might render this in Taoist terms with the opening line of Lao Tzu's *Tao Te Ching*: "The Tao that can be spoken is not the enteral Tao". Tzu, 1963.

explanatory tool for those regions of being that Castoriadis describes as magmas, such as the social imaginary, the unconscious of the human psyche, language as a living process, and mathematics (which Gödel and Turing showed is fundamentally indeterminate and incomputable). When Castoriadis proposes that a new logic is needed to describe these processes, he is arguing for opening the space of reason to indeterminacy.[178] This is the receptivity to a pluralist notion of reason that Kompridis argues is required to open up the space of possibility to the new. This openness aligns with the argument for a "responsivity" made by Bernard Waldenfels (discussed in further below in Chapter Three and again in Part III), in relation to his argument that the loss of a foundational universal order is a "shattering" of the world, which requires an attentiveness to the conflicts, overlaps, and borders between various orders.[179]

The abstract nature of the Castoriadian concept of signification is important for understanding how computational logic might be generative of social imaginary significations that institute social meaning. Following Castoriadis' model, there are central social imaginary significations around which further machinic imaginary significations are organised. To understand this, we must first understand that computation is an individuation of the proto-institutions of *legein* and *teukhein*, albeit in an historically novel way. As discussed above, the mechanisation of logic was a synthesis of theoretical and practical reason, i.e. *legein* (distinguishing-choosing-positing-assembling-counting-speaking) and *teukhein* (assembling-adjusting-fabricating-constructing). Computation is nothing less than a new institution from which a patterning of the social extends *legein* and *teukhein*. Around the institution of computational reason a whole constellation of new social imaginary significations form, many of which escape the capacity of human perception to comprehend. *Those significations which expend beyond the horizon of human experience are what constitute the machinic imaginary*.

The institution of social imaginary significations is dependent on the instituted logic through which the world is organised. To discern how the imaginary is instituted within computational society, a study of computational logic and its application in social activity is necessary, thus Part II is dedicated to this task. For now, however, the more general point is that the machinic imaginary is conditioned by a non-human reason leads to a non-human dimension of the social imaginary. Which is to say that this imaginary is generative of and operative through social imaginary significations not directly stemming from the psychic activity of human minds. Instead the machinic activity of computational processes is the driving force behind aspects of creation

[178] Castoriadis, 1984, pp.216–217.
[179] Waldenfels, 1996.

of the social-historical world. Considering this, a theory of subjectivity is needed that is not bound by human psychic experience (conscious nor unconscious). Simondon's notion of transindividuation is useful for understanding the transsubjective character of social-historical becoming because it introduces a transversal relation between different forces of creativity (the radical imagination of psychic activity and machinic activity). The machinic imaginary leads to a radical self-differentiation within the social imaginary, of which it is a component—or to borrow a term from Brian Massumi, a "subjective subtendency" within the broader "transsubjective" movement of social-historical becoming.[180]

A theory of machinic signification is elaborated in Part II once certain methodological foundations have been put in place in Chapters Two and Three. For the moment it will suffice to note the relevance of machinic signification. The machinic dimension of the social imaginary produces a new set of affordances for the articulation of the social world by expanding "the cultural repertoire of interpretive patterns".[181] This expansion influences individual articulation and pre-reflective experience, due to their mutual constitution with the cultural repertoire of interpretive patterns (social imaginary significations).

To summarise, signification is socially instituted, and at the same time the institution of signification is the creation of the social. Therefore, automated processes of a dynamic, social character—that is, not simply mechanistic—have an impact on the mutation of meaning. The extent to which this leads to global changes in socio-cultural meaning (social imaginary) is yet to be seen. However, I postulate that, with the continued development of computational systems embedded in social life, a global impact will take place.

This section has shown how we can move away from the question of governmentality, through a politics of the imagination, to the problematic of world articulation, which I propose as way into a critique of computation in its most contemporary manifestation. Due to the incomprehensibility of the machinic imaginary, I argue that reflective articulation (or disclosure) is an *even more* challenging task than Kompridis or Castoriadis believe it to be. Nevertheless, with a post-phenomenological approach it will be possible to begin to unpick the problematics faced by a technopolitical approach to reflective articulation. Thus in the recursive fashion of this

[180] Massumi, 2018, p.61. Transsubjectivity and subjective subtendencies will be returned to in Part II of the next chapter.

[181] "Thus we should not simply speak of an interplay between experiences and articulation, but rather of an interplay between the situation experienced, our prereflective experience, our individual articulation, and the cultural repertoire of interpretative patterns. We may constantly strive for an attunement between these levels, but we will only rarely and never permanently attain it. But in this very process–in the attempts to achieve this attunement–new values are produced." Joas, 2002, p.514.

thesis' argument, the post-phenomenological pluralisation of reason will lead to a more complex picture of world articulation, which will then produce the new problematic explored in Part III.

Conclusion

This chapter addressed a strand of the literature on computational society that explicitly delineates political programmatics though different critical analyses of technology. The term technopolitics was used to describe this loose set of theoretical approaches to the question of the politics and the political vis-à-vis technology. It is within this discourse of technopolitics that this research project finds its critical context. I argue that the question of what sort of politics can and ought to be proposed and enacted in twenty-first century computational society remains contested and contestable. What is clear is that the type of technopolitics developed is dependent on the analytical framework through which one approaches technology and computational logics. This is an additional factor alongside the broader theories of society and of political change that one takes as axiomatic.

I have shown how the theory of political transformation, and conception of society, developed through an analysis of computational technologies is informed by the degree to which one understands subjectivity and agency. That is, the degree to which they are sustained or delimited by contemporary digital media and computational infrastructures. Accordingly, politics is here understood broadly as the capacity to think propositionally about the organisation of the social world, and the strategies and tactics required to meaningfully organise and act upon the world according to such propositions. To think propositionally in such a manner requires a reflective engagement with the world that Kompridis describes as reflective disclosure, and which I am redesignating as reflective articulation.

The question of technology in relation to politics as defined above is evident in the capacity-building of technological practices. That is, that technology, and technological practices, increase the capacity to act in certain ways while decreasing the ability for other practices within the social repertoire (this is an argument made by Don Ihde and Peter-Paul Verbeek).[182] However, there is another aspect of the relation between technology and world-articulation. That being the extent to which the world is articulated techno-logically, according to the specificities of the perceptive and analytical capacities of technological processes acting semi-autonomously in and on the world, creating it in their own image.

[182] Ihde, 1990.; Verbeek 2005.

The technological articulation of the world poses a challenge to the possible reach of reflective articulation. The automated computational processes that drive many areas of social life from the economic, infrastructural, governmental, and even cultural are particularly problematic for reflective articulation. These computational processes do not algorithmically channel action in simple, mechanical fashion. The interactive and social dynamic of contemporary computing proceed via strings of inferential reasoning driven by the intra-action of social relations and computational reason. The decisional reasoning of contemporary computing makes predictive judgments and comes to analytical conclusions about the world and the future, articulating a world accordingly. This is a non-reflective world articulation, while at the same time being a highly creative and dynamic articulation. The extent that reflective articulation can be fully enacted requires consideration of the intra-active relation between this machinic articulation and human-psychic articulation of the social world. To what extent can semantic, normative, and cultural change be brought about when social creation has been so thoroughly automated?

By refusing to ontologically reinstate governance in computational reason, the focus on decisions, or decisional reasoning can create an opportunity to situate the politics of computation in relation to both imagination and automated computational processes. It is possible to recuperate and reappropriate the evaluation of the automation of the decision towards an analysis of its relation to the social imaginary for the following reasons. Firstly, imagination is fundamental to decisional reasoning because, without the ability to imagine—to represent what is not present, project into the future, or offer counterfactuals and hypotheses—the space of possible action cannot be mapped out, thus reducing action to *reaction*. Secondly, to the extent that computational processes constitute the automation of action in the world, they are by definition an automation of decisions if one takes action to be the consequence of decision (conscious or otherwise).[183] And finally, politics is the continual contestation of which actions are possible, who is able or allowed to act, and when and how they are allowed to act—if they are at all. That is, politics is a question of the way in which members of a society make, break, or amend the rules by which they live and are governed—which, as we shall see, is precisely the field of the imaginary described by Castoriadis.

The politics of the decision is therefore crucial to understanding how to make and remake society in a way that deviates from the nomos of the given and, following this definition, democratic politics is the ability of a society to define its own limitations apart from extra-social

[183] This is a bold claim for sure, and rests on a definition of decision that includes unconscious, non-conscious, or pre-conscious processes that abstract and select an action from the range of all possible actions in light of an event in the world.

normative legislation. This self-limitation—the ability for a community to bring itself into question and redefine itself therein—is the political ideal often referred to as *autonomy*. As will be argued below building on the work of Cornelius Castoriadis, imagination has a key role in autonomy as it is the capacity *to think otherwise from the given*, yet at the same time, it is that which generates and re-presents society to itself at any one time. Imagination thus has both ideological *and* emancipatory potential, a Janus-faced character that is rarely (if ever) recognised—neither by those who conceive of imagination as untruth and irreal, nor by the political discourse of "alternative futures".[184]

What the literature on technopolitics demonstrates is that comprehending the computational dynamics of social-cultural production is necessary when developing a politics today. Turning to a politics of imagination is not enough without an adequate critique of technology. This critique of technology must be able to account for imagination, while sustaining the legitimate concerns with governmentality and control. Where is this middle path? How do we synthesise the overly voluntaristic politics of imagination with the overly structurally-deterministic technopolitics of governmentality? What is common to both is the misrecognition of technological-computational processes as lacking a subjective dimension that is more-than-human. This lack of recognition comes from an analytical perspective that submits (to varying degrees) the technological dimension of society to the will of a human designer, engineer, programmer, or collective (populace). Moreover, as a consequence of the design-oriented functionalist analysis, technology is treated as mere *matter*. Even in the case of new materialist revitalisation of matter as agential, meaning and imagination is rarely considered as an internal dynamic of matter. Meaning and imagination carry with them anthropological connotations regarded as too strong to be appropriated within a material analysis of the non-human. Even when matter is framed as 'more-than-human'—in order to account for the human dimension within material processes while also recognising the alienness of those same material processes—meaning will invariably originate from and lead back to some human element. Meaning, it seems, is a very human experience. It is against this conception of meaning that the following chapters are aimed.

A key problematic of computational society is the ingression of a new form of abstraction that presents a historically unparalleled challenge to thought as we know it. Computational abstraction presents a challenge to thought because it presents a creation of a world—a machinic imaginary. This machinic imaginary is thought thinking itself without the human, which, might itself be considered an 'automation' of praxis in that it is the becoming autonomous of the work

[184] Rupert, 2006.

of thought on the world. The challenge of automation understood in these terms, therefore, requires not only the need to evade the capture of subjectivity by instrumental reason or cybernetic control, as the literature surveyed in this chapter focuses on. The challenge is also to understand how to contend with the ingression of novel vectors of subjectivity that partake in the dynamics of society and history, whether they be adversarial, cooperative, or neutral. This problematises earlier models of praxis understood as the uniquely human practice of the elucidation of the world.

The impetus behind studying machinic vectors of subjectivity in view of developing a theory of praxis is concerned with not only how we act on the world in a practical manner, but the abstractions and expressions that constitute the world and facilitate action in the world. Praxis in this regard is just as ideational as it is material, to the extent that a sharp distinction between materialism or idealism is inconsequential, if not counterproductive. The aim then, no less now than ever before, is to imagine how "to create a new relationship between thinking and doing, how to elucidate things in terms of a practical project without falling back either into the system or into doing just anything."[185]

In the next chapter, a post-phenomenological framework will be proposed to approach the concept of the machinic imaginary. After which Part II will return to the above considerations of computational society though a detailed examination of computational functions, techniques, models, and applications, as propositional examples through which the post-phenomenological method will be articulated. Thus, the next five chapters will progress towards a return to the topic of a technopolitics of world articulation in Part III, with a re-evaluation and exploration of the ideas this chapter has only began to motion towards.

[185] Castoriadis, 1993, p.276.

Chapter Two: Towards a Post-Phenomenology of Technology

Introduction

The previous chapter examined the literature on computational society, in which computation is reduced to governance, with the global computational network folding all social relations in its processing. Briefly introducing Simondon's philosophy of technology, it was argued that the common problematic of these technopolitical positions is that they have an inherent anthropic functionalism—they lack serious engagement with computation from the standpoint of technological ontogenesis, and thus foreclose the possibility of a machinic imaginary. As an alternative to these dominant approaches to technopolitics, I proposed turning to world articulation as a political site of praxis. The reflective articulation of the world, however, requires an elucidation and interrogation of the social imaginary institution of society.

With this framing of world articulation within computational society, Chapter One served as a contextualisation of a central problematic of this thesis: *how do we theorise a technopolitics that engages with the technical dimension of the production of the social imaginary?* How, that is, does computation articulate a world for itself that institutes the social world, but remains only *partially co-extensive* with the human horizon of meaning? And how do we address this in the context of a system of representation that is always-already caught within a colonial-capitalist-patriarchal conception of the given that determines meaning? The proposition that the social imaginary—understood as a world of significations—is more-than-human requires an expanded definition of meaning and signification because such concepts historically carry an exclusively anthropic connotation. To approach the issue of worlds of signification beyond the human—of non-human/alien imaginaries—we must turn to debates within (post-)phenomenology.

This and the next chapter therefore flesh out a 'methodological' framework for the study of computational society centred on the elucidation of the concept of world articulation. To do so they engage with current debates in phenomenology and post-phenomenology, arguing that these philosophical debates can provide a robust framework for building a critique of computation centred around the problematic of the social imaginary. Guiding this argument is a concern with the constitutive forces of the social imaginary articulating the world in which we find ourselves, and how we might elucidate and interrogate the world if there is an inaccessible

dimension to social structures of meaning fundamentally beyond our comprehension.

Post-phenomenology is the extension of the problems and questions of phenomenology beyond the limitations of subjectivism. It goes beyond subjectivism because it situates subjective consciousness within a broader transsubjective ontology of culture and the world, beyond direct human experience (the world *tout court*).[186] Post-phenomenology is the enlargement of the phenomenological study of the lifeworld as the horizon of meaning beyond the human, to encompass the macro-analysis of culture/society and the "natural world" as a transsubjective mode of being (transindividuation, social-historical being).[187] Such an approach, I argue, can provide a new perspective on the computational world articulation (as a logical extension of the scope of the cultural analysis of meaning). In sum, post-phenomenology is here proposed as a methodological approach to the cultural critique of computation. The reason it is *post*-phenomenological is because it seeks to account for structures of meaning within computational society that institute the social imaginary, without those structures of meaning necessarily being of human-biological origin, or even being ultimately intelligible (i.e. they are fundamentally of another kind of intelligibility). Accordingly, this chapter asks how meaning might arise within computational processes—*qua* the processes themselves—beyond the limitations of the transcendental subject, and thus how such processes can be said to *create worlds*. (This in turn requires further elaboration through questions such as: What is a world without a subject as traditionally understood? How is subjectivity understood in this sense?)

I argue that there is a need to engage with the problematic that arises once we recognise the existence of machinic worlds, or machinic imaginaries that escape the anthropic horizon of meaning while *at the same time* instituting the social world. Such a situation would suggest that the social-historical world is instituted through the interaction of multiple worlds that are only partially convergent. In other words, I wish to shore up Castoriadis' insight that the social-historical is a divergent plurality that cannot be grasped by ensidic logic.[188] However, I go beyond

[186] Following the lead of Johann P. Árnason and Suzi Adams' reading of Castoriadis the post-phenomenological approach allows us to define imagination as a dynamic trans-regional ontological force of world articulation. Adams defines post-phenomenology as follows: "Whereas phenomenology was originally concerned with the philosophy of consciousness and the subject, post-phenomenological approaches emphasize the anthropic confrontation with the world—and its cultural articulation—as a trans-subjective context of meaning in need of permanent elucidation and interrogation." Adams, 2007, p.3.

[187] Mark Hansen describes all post-phenomenology inquires as extensions of Husserl that "all share the fundamental conclusion—which simultaneously announces the end of the phenomenological project proper—that worldly temporalization happens beneath, if not in some sense *prior to,* the (temporal) experience of individual time-consciousnesses." Hansen locates this shift in Eugen Fink, Jan Patočka, and Merleau-Ponty. Hansen, 2015, p.26.

[188] "Ensidic logic" is a term from Castoriadis' idiosyncratic nomenclature. It is a catchall term to refer to the identitary, set-theoretical (ensemblistic) logic (and ontology) of the inherited tradition of Western philosophy. See Castoriadis, 1987.

Castoriadis in proposing that this plurality is not only diachronic but *synchronic* and more-than-human. To defend this position I draw on the post-phenomenological work of J.P. Árnason and Suzi Adams, who critically update Castoriadis through their respective considerations of the problematics of transcultural civilisation and the question of nature in the social imaginary institution of society. Rather than transcultural civilisation, however, I use the post-phenomenological approach to look at the self-differentiation of the social imaginary with the emergence of a machinic imaginary in Part II. Examples illustrating the post-phenomenological analysis of the machine imaginary in Part II include the ecological dynamics of the evolution of high-frequency trading (HFT) algorithms,[189] as well as the imaginary affordances of particular learning functions by which machines articulate a world (for example, transformer networks).

As a supplement to the above thinkers, and with an eye to Part III, I briefly introduce Bernhard Waldenfels' discussion of the alien and the traversal of boundaries in Chapter Three. Chapter Seven (in Part III) provides a more thorough exploration of the question of boundaries between different orders or articulations of the world as a shattering of the unified image of thought and monist world. That chapter works through issues of interpretation and opacity, in view of a pluralistic post-phenomenological perspective on multi-logical worlding and the according question of alterity. In an extension of Chapter Six, which focuses on the abstract articulation of the social world as it is read by machine processes, Chapter Seven considers the way in which machine processes are read and interpreted by humans, and therefore why the boundaries between these different orderings remain untraversable.

In sum, the post-phenomenological perspective developed in this, and the next chapter builds on the previous chapter by introducing a methodological framework for thinking about technology and technopolitics, in preparation for later chapters. The post-phenomenological methodology goes beyond the horizons of the theoretical positions explored in the previous chapter towards a transsubjective theory of world-articulation. The concept of transsubjectivity is a way to account for non-human modes of being in the world as having inherent meaning apart from (although not necessarily without) the human.

This methodological argument begins in this chapter with an overview of phenomenology and the going beyond of the 'post-'. Following this is a survey of phenomenological engagements with technology that are unable to account for non-human signification. Machinic signification is not dealt with in the phenomenological engagements reviewed because of their commitment to human subjectivity as far as the question of meaning is concerned (as does much of the

[189] Bogdan and Wilkins, 2014.

literature on the post-human as far as the artificial and non-biological is concerned). This includes an in-depth analysis of Mark Hansen's attempt to forge a partnership between Alfred North Whitehead and Edmund Husserl. Hansen engages with what he describes as the "becoming-worldly of sensation" with the advent of twenty-first-century media. Finally, Yuk Hui's philosophy of technology is discussed in order to present the differences between a post-phenomenological approach to technology built upon Heidegger and Husserl, as opposed to the approach Chapter Three develops from Merleau-Ponty to explore beyond the phenomenological.

To engage with the machinic imaginary without reducing it to the human use of machines, I will develop an analysis of the ontological turn of Maurice Merleau-Ponty's phenomenology towards a rearticulation of the philosophy of Castoriadis. Through this rearticulation it will finally be possible to construct a post-phenomenology from Castoriadis' poly-regional ontology of being.[190] This will lead on to the question of nature in post-phenomenology, the post-phenomenology of Simondon, and ultimately to a post-phenomenological reading of technology.

The following chapters in Part II will trace the emergence of the machinic imaginary and its ingression into social-historical being with examples of 'learning' functions that generate proto-significations. Also considered are how these proto-signification are then instituted as social imaginary significations within large-scale systems of machine-to-machine interaction and the interaction of these systems with non-technical dimensions of the social world. This current chapter thus lays the methodological foundations for a reading of computational society, in a manner that draws out a facet of computation absent from the previous theoretical positions regarding technopolitics and technological world articulation.

The Afterlife of Phenomenology

If, as Habermas claims, the phenomenological project disintegrated after a productive period in France with Sartre and Merleau-Ponty, phenomenology has nevertheless experienced a rich and lively afterlife in the philosophy of technology.[191] It therefore pays to engage with phenomenological approaches to technology to demonstrate exactly where this thesis converges with particular phenomenological themes, and where exactly it departs and diverges. This will

[190] I borrow this description of Castoriadis' ontology from Suzi Adams: "Castoriadis elucidates the living being in a way that to some extent blurs the boundary between anthropic and non-anthropic regions of being, as part of the emergent poly-regional—or dimensional—ontology of the *being-for-itself*." Adams, 2008, p.394.
[191] Habermas, 1992, p.4.

avoid any misreading of the argument that may arise from a conflation with phenomenological perspectives on technology that have been made by others.

The prefix 'post-' designates a going beyond while remaining committed to certain principles. Accordingly there is a plethora of what we might call 'post-phenomenological positions' that share certain tendencies in their mutual conservation of phenomenological principles. Nevertheless, they each differ widely in the particular phenomenology they draw from and how they intend to transgress. To a certain extent it could be said that post-phenomenology is a suitable moniker to describe all of phenomenology after Husserl. If this is the case, then the prefix withers into a redundant tautology if assigned to phenomenology.[192] Heidegger's ontological excavations in search of the phenomenological ground, for instance, or Merleau-Ponty's emphasis on embodiment and gesture, still remain (mostly) within phenomenology.[193] Yet how do we classify thinkers engaging with the core problematics of phenomenology while simultaneously drawing from other traditions of thought? What of the work of Nicolas Luhmann, who explores the problems of phenomenology at level of social systems, or Castoriadis, who interrogates the emergence of phenomenological structures of signification across social-historical being, or Derrida's deconstruction of the limits of phenomenology?

Árnason's posing of this very question in a 1993 article in *Thesis Eleven* leads him to coining the term post-phenomenology to describe such thinkers.[194] Árnason's question is partially in response to Habermas' statement that phenomenology is an outlier in modern philosophical schools of thought when compared to the various post-isms of post-structuralist, post-analytic, and post-Marxist thought.[195] In fact, Árnason's disagreement with Habermas turns around what Árnason characterises as a gross misreading of Merleau-Ponty by Habermas. The argument being that Habermas fails to appreciate the significance of Merleau-Ponty's ontological turn to the problem of the world—most radically transformative in *The Visible and The Invisible* but already present in his early engagements with sociology and structuralism—which opens a path towards phenomenology's own post-ism from 'within', as it were. I return to Merleau-Ponty below to argue for a methodological approach to the critique of computation in line with the post-phenomenology of Castoriadis, Árnason, and Suzi Adams, as well as the post-phenomenological connection between Simondon and Merleau-Ponty. Before going beyond

[192] As Suzi Adam asks: "If phenomenology has always consisted in heretical readings of Husserl, is the question of post-phenomenology superfluous?" Adams, 2007, p.3.
[193] I say 'mostly' because, as discussed below, Merleau-Ponty's later to turn to nature and ontology served as the beginning of a more radical break with Husserl that was tragically cut short by his untimely death.
[194] Árnason, 1993.
[195] Habermas, 1992, p.3.

phenomenology, however, we must first sketch an understanding of what it is that requires overcoming.

To echo Merleau-Ponty's opening question of *Phenomenology of Perception*: What *is* phenomenology? This current thesis—which takes *post*-phenomenology as a method—demonstrates that the "question is [still] far from resolved" a century on from Husserl's first works.[196] Phenomenology as the philosophical method conceived by Edmund Husserl is concerned with the description of essences as they arise in experience, aimed thus at the constitution of a science of *phenomena* (whether this final goal is even achievable is another matter). The term "science" denotes, in this instance, a purely *a priori* science that would serve as a foundation for the empirical sciences. Husserl's phenomenological project is, therefore, within the Kantian tradition of transcendental philosophy, and yet it is resolutely distinguished from transcendental idealism in placing consciousness within in the world. What this exactly entails was the main concern of Husserl's philosophical output. As is well known, Husserl's phenomenology underwent gradual revisions from descriptive to transcendental phenomenology, with a further shift from static to genetic phenomenology in the 1920s.[197] Of these, the transcendental reduction is of particular relevance to the study at hand because it is in the transcendental ego that phenomenology locates the originary seat of experience, intentionality, freedom/agency, and intuition. From the attempt to study the transcendental conditions of experience Husserl derived what Merleau-Ponty calls "the central theme of phenomenology": the description of the lifeworld (*Lebenswelt*).[198] The problem of the lifeworld required a reversal of the previous bracketing of the world to study the transcendental properties of phenomena. Instead, studying the lifeworld amounts to an analysis of the conditions of possibility for the conceptual abstractions of science and metaphysics to have meaning as such.

Thus the question of the transcendental and its relation to the lifeworld is the key site of contestation differentiating traditional, orthodox readings of Husserlian phenomenology from the heterodox, post-phenomenology at which I wish to arrive. Furthermore, it is the manner and direction in which the move beyond the transcendental ego is taken that various phenomenological investigations can be derived. Most notably, Merleau-Ponty's *Phenomenology of Perception* is initiated by what he deems an internal contradiction in Husserlian phenomenology between the desire for an *a priori* and the commitment to world (for this reason he argues that

[196] Merleau-Ponty, 2002, p.lxx.
[197] The shift to a genetic phenomenology takes place in Husserl, E 2001, § 4.
[198] Merleau-Ponty, 2002, p.viii.

Heidegger's *Being and Time* is by extension not such a radical a break from Husserl).[199] Going beyond phenomenology towards the post-phenomenology sketched out in this chapter means retaining certain fundamental concerns, most importantly the theme of the lifeworld. In studying computational society we are confronted with a mode of existence (computation) that is co-constitutive of the social world—computation has become endemically productive of our lifeworld(s). At the same time, however, computation is not fully human, and to reduce it to a mere tool is to strip it of its capacity to "deepen our insertion into being."[200]

One of the most significant transformations of Husserlian phenomenology is that undertaken by Heidegger with his ontologisation of the phenomenological project. For this reason, and his substantial contribution to the philosophy of technology, Heidegger's influence reverberates in contemporary phenomenology of technology, not least of all because of the development of his philosophy by Bernard Stiegler and Yuk Hui. Stiegler and Hui draw heavily on both Heidegger as well as returning to Husserl for a highly productive engagement with technology and the question of time.[201] This approach to technology has been widely received and is influential in various fields of cultural and critical analysis and practice. However, as explored in more depth below, the initial questions and problematics of Stiegler and Hui ultimately lead to a different set of conclusions and political concerns regarding technology from those of my thesis. Namely, the influence of Heidegger's philosophy of technology, which is grounded in his notion of ontological difference and separates technology from nature. Heidegger argues that the essence of modern technology is that of "enframing".[202] While *techne* is, according to Heidegger, an originary attitude towards the world, modern technology stands apart from the natural as an objectification of nature that distances itself from Being. Modern technology is a solidification of techno-scientific rationality into the tool, with the latter reduced to a frame through which the perception of the world is given to us in modern times, rather than having an ontological dimension *in-itself*.

Another line of flight we might trace from Husserlian transcendental phenomenology to the philosophy of technology is through the aforementioned Merleau-Ponty. This line might itself be followed in various directions, the most well-trodden path being the folding of technology into embodiment. In this reading of Merleau-Ponty's phenomenology as a method for the analysis of technology, technological artefacts and media function as extensions of perception,

[199] Merleau-Ponty, 2002, p.viii.
[200] Merleau-Ponty, 1964b, p.123.
[201] Stiegler, 1998; Hui, 2016a.
[202] Heidegger, 1993a.

with the human at the centre. Yet embodiment, although of primary significance in Merleau-Ponty, is not the only dimension of his thought amenable to a critique of computational technology. The lifeworld is a major theme in phenomenology, not least that of Merleau-Ponty. Although it only first appeared in Husserl's thinking as late as Part III of *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy*,[203] the lifeworld was a central idea taken up by Heidegger, and Merleau-Ponty's reading of the unpublished *Crisis* volume in the Husserl archives had a foundational impact on his own phenomenological studies.[204] The notion of world is arguably one of the most enduring and productive phenomenological concepts for the study of culture and society because it seeks to describe the background structuration of signification that constitutes the subjective experience of phenomena. However, due to their different approaches to the question of the lifeworld, the choice of which phenomenologist to follow has ramifications for what kind of post-phenomenological theory of meaning can be extended beyond the human, if at all. The strand of post-phenomenology that this thesis seeks to develop in relation to computation follows the thoroughly original direction of travel set out by Merleau-Ponty towards the end of his life. From there, it will be argued, we can draw a line to both Gilbert Simondon and Cornelius Castoriadis. Doing so unearths some striking similarities in their thought, which can be brought into a productive dialogue with Merleau-Ponty and one another to construct and address the problematic of this thesis.

Phenomenology of Technology, an Overview

A brief working definition of post-phenomenology was given in the introduction to this chapter. To further refine the working definition, post-phenomenology will now be delimited from that which it is not. One such line of phenomenological enquiry from which to distinguish the methodology of this thesis is the media theory of Mark B. N. Hansen. Hansen's early work explores the embodied experience of media technologies and their role in cognition. A major concern of late 20th century media theory was the notion that the disembodied flow of information across computer networks would lead to a destabilisation and dematerialisation of subjectivity.[205] In *Philosophy for a New Media*, Hansen criticises these media theories of the image for their unanimous erasure of the body, arguing instead that digitisation actually requires a

[203] Husserl, 1984.
[204] Matthews, 2002, p.3.
[205] See for example: Crary, 1992; Mitchell, 1992.

deeper inscription of the body into the process of the image.[206] From a perspective derived from the philosophy of Henri Bergson, Hansen argues that the body gives form to formless information through a process of "enframing." Subsequently, Hansen's position is that concepts like "machinic vision" are unintelligible without the embodied human subject that is the ordinary site of vision.[207] Machine vision divorced from the body is not vision at all but a flow of information that only acquires meaning as visual once it enters into a convergence with the visual regime of the body. Hansen's defence of embodiment has the effect of placing the human organism at the centre of a lifeworld that extends out beyond the body into a media system. The human merges with the machine, but the latter is fully reliant on the former for any existential meaning.

This reading of technology as an extension of embodiment or as a cognitive enhancement is mirrored in contemporary philosophy of mind and the cognitive sciences. Andy Clarks' work on extended mind, for instance, pushes the boundaries of cognitive science away from an atomistic view of the 'brainbound' towards a deeper understanding of our implication in the environment. Extended mind theory (EMT) goes a long way towards opening a productive engagement from the scientific community towards thinking about the mediated experience of mind. The notion of extension throws open the doors to intersubjectivity, as well as a hybrid human-machine ontology of the human. Another example of the extension of cognition beyond the individual via technical mediation is Edwin Hutchins' book *Cognition in the Wild*, in which he develops the idea of social cognition.[208] Hutchins describes the distributed cognitive process of navigating a large ship as more than the sum of individual cognitive processes. Hutchins argues that distributed cognition has its own properties that require investigation on their own terms. In Hutchins' example the ship functions as a medium for cognitive processes that aggregate into a single cognitive process.

In his book *Feed Forward*, Hansen starts to move this idea of extension towards an engagement with the extension of *sensation*. Developing a "speculative phenomenology", he argues sensation is extended into the technical infrastructures of twenty-first century media. Ultimately, the post-phenomenological framework proposed in this chapter is a response to the tendency to overdetermine the functional aspect of technology as a mere extension of the body or cognitive faculties. Nevertheless, Hansen clears a considerable amount of space for thinking about how computation participates in the social imaginary by engaging with the technical infrastructures of

[206] Hansen, 2006, p.10.
[207] Johnson, 1999.
[208] Hutchins, 1995.

experience. An extended discussion of his speculative phenomenology of technology is therefore worthwhile.

Mark Hansen's Speculative Phenomenology

Feed Forward has a much closer approximation than Hansen's preceding work to my theorisation of a multi-dimensional world of computational society. Hansen attunes our attention to the fact that much of the activities of computational media take place at sub-perceptual scales of time and space, and in abstract dimensions outside the direct availability of human cognitive processing (big data aggregation and analysis, for example). As a consequence, he argues, the technical mediation of human experience enacted though computational media are "*resolutely non-prosthetic*", in that they have no functional correlate in pre-existing human perceptual capacities or faculties.[209] While this entails a "demotion" of the mediation of aspects of human experience such as sense perception and consciousness, the affordances gained are the "expanded sensory contact with 'world sensibility'".[210] By this he means that ubiquitous computational media provide a radically environmental sensory experience, diffusing subjectivity into the environment though the mediatic processing of data from the social world. Hansen thus pursues an engagement with the "general sensibility of the world" made of human and media systems through a synthesis of Husserlian phenomenology and the speculative philosophy of Alfred North Whitehead. The main thrust of Hansen's argument concerns the latter's placing of "human experience in relation to a larger domain of experience", that of the cosmological, or to use the phenomenological term: the "worldly".[211] Hansen stresses the entanglement of human experience with contemporary media environments in light of the direct registration of the environment by machines prior to any human engagement. As he quite rightly notes, this marks a shift away from humans holding the privileged status as the unique addressees of media:

> […] media impact the general sensibility of the world prior to and as a condition for impacting human experience. This situation is both re-vealed to us *and* intensified by the computational technologies constituting twenty-first-century media, and this peculiar combination of revelation and intensification allows us to be quite specific about the agency of twenty-first-century media: *at one and the same time*, twenty-first-century media *broker human access to* a domain of sensibility that has remained largely invisible (though certainly not inoperative) until now, *and*, it *adds to* this domain of sensibility since every

[209] Hansen, 2015, p.69.
[210] *Ibid.,* p.5
[211] *Ibid.*

> individual act of access is itself a new datum of sensation that will expand the world incrementally but in a way that intensifies worldly sensibility.[212]

Hansen points further towards a particular feature of "doubleness" in contemporary media society, in reference to the incorporation into the mediatic sensibility of the world as well as the contribution of media to sensibility itself.[213] The crux of his argument resides in "the fact that the act of accessing sensibility itself produces new data of sensibility," which he calls the "data propagation of sensibility".[214] This, he argues, has transformed the very ground of human experience. Hansen's argument here comes close to that which is being set out by this thesis, except that his emphasis is on the continuity of sensation between the technical and the biological human. Instead, I want to explore the relations of signification that occur between media that do not address humans directly, such as the machine-to-machine interaction of high-frequency trading: what happens at this level of mediatic interaction? What does a data set *mean* to a neural net, for example? The stock answer would be that the very question is absurd, that it stretches the notion of meaning too far, that meaning is predicated upon a conscious subject not a mathematical-electronic process in a machine. But this is precisely the point. One of the major claims I wish to defend is that meaning and signification do not occur *only* at the higher-order level of human (or animal) consciousness. Just as Hansen argues—through a reading of Whitehead—that sensation (and thus consciousness) is worldly, I argue that signification is worldly because it is an inherent quality of relations at every order of complexity (what Whitehead calls value, Castoriadis calls proto-meaning, Simondon calls information).[215] Put otherwise, signification as I understand it is environmental and relational. The transductive process of forming a relation, as described by Simondon, is an *imaginative* act of creation through which forms, and the world as form, individuate, that is are in-formed. This highlights the connection between Simondon's discussion of imagination and invention and his theory of individuation and information (discussed in Chapter Four).[216]

A further overlap with Hansen's thesis in *Feed Forward* and my own is the attempt to think through the ramifications of ubiquitous computing for experience. The ubiquity of computation embedded in the infrastructure of daily life presents a situation in which much of our world is beyond the reach of any perception or primary intuitive 'access' required to grasp and

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[212] *Ibid.,* p.6 (emphasis in original).
[213] It is here that Hansen is explicitly engages with phenomenological notion of intentionality in that he sees this doubleness of computational media combine within a single technical operation "an 'aboutness' *and* a 'just being'", which according Husserlian phenomenology is not possible within the operation of consciousness, *Ibid.,* p.7.
[214] *Ibid.,* p.8
[215] Simondon, 2005; Castoriadis, 2002; Whitehead, 1985. On proto-meaning and information, see Chapter Four.
[216] Simondon, 2008; Simondon, 2005b.

comprehend it. Our awareness of the background processes running much of our wired lives is only secondary and indirect (what N. Katherine Hayles calls "non-conscious cognition"), and even in those cases in which those processes are made explicit by systems managers or programmers, they remain only partial because they are always interfaced by code.[217] As Wendy Hui Kyong Chun notes, despite the fact that the computer is in fact the "most non-visual and non-transparent device", we have a paradoxical situation in which visual culture and visual concepts like transparency are so often linked to computation, yet in order to represent in visual form on the screen, it must hide what it is doing: computing.[218] Computation takes place in the processing of the binary code of machine language and the flow of electrons around a circuit, not the visual forms we see on screen. The screen is an interface, and what is presented on it are not the computational processes themselves. Human-readable coding languages like Java or C++ are translations and therefore visual representations (to the extent that written text is visual). The idea of software as computation itself, argues Chun, is a misunderstanding stemming from the domination of the visual in culture. It would make little sense, then, to describe the machinic imaginary as visual and to look to software for the machinic imaginary. We might decipher what the machine imagines by inferring from interface representations, but this must be done with the same critical reflection that we would apply to the study of a painting. The machinic imaginary—much like the social imaginary but for somewhat distinct reasons—necessarily departs from the understanding of imagination as a form of visual perception in the mind's eye. In theorising the machinic imaginary we need to draw on theories of imagination that position the latter as a process of production and reproduction of ideas, relations, and forms, rather than the forms themselves. The products of imagination and the social imaginary are not static representations—an imaginary representation of a utopian society, for example—but rather an ongoing process of signification through the mapping of meaningful relations that creates worlds.

To comprehend the radical transformation that has taken place with the emergence of twenty-first-century media, Hansen—through a particular reading of Whitehead—proposes that we need an environmental understanding of media. He argues that the environmental character of media has taken on the function of the ground from which the "higher-order" processes of consciousness and perceptual experience emerge. Similarly, the machinic imaginary is a dimension of the social imaginary, which is nothing less than the institution of the conditions of possibility of thought and action. However, a crucial point of divergence from Hansen is that

[217] Hayles, 2017.
[218] Chun, 2004, p.27.

the social imaginary is constituted of a plurality of structures of signification or meaning—human, computational, and otherwise. These structures of meaning are convergent and mutually constitutive at the level of organisation of the social-historical, but they are *only partially co-extensive* as regards their respective horizons of meaning. In other words, what is here understood as a meaningful relation, or a relation of signification, between several data points as inferred by a machine-learning algorithm may not be comprehensible within the horizon of human meaning. What may appear as non-sense to a human interpreter may still have effects within the social field, and thus exist as a social signification. What this implies is that not only will machinic significations become data for future computations, but also that their effects may be interpreted as significations within a non-machinic horizon of meaning. Furthermore, this entails the proposition that a transmutation of signification occurs as it passes into the social imaginary, becoming intelligible through processes of restructuration and sedimentation into social imaginary institutions (as will be further elaborated in Part II).

The incompleteness of the co-extensivity of horizons implies that the machinic imaginary is not wholly graspable on a fundamental level by human experience. This is possible because of the inexhaustibility of being, in which both humans and non-humans participate as creators of world. Being is determinable as a world but inexhaustibly so. The concept of the machinic imaginary points to a specific but distinct determination of being (the world *tout court*) as meaningful to computational technology. This determination of a world is *articulated* according to the specificities of the computational operations undertaken in said determination. Hansen, however, is concerned foremost with expanding the range of human experience. As Beatrice Fazi has argued, this results in Hansen omitting the in-depth engagement with computational operations and logics needed to conceptualise these computational determinations on their own terms.[219] This results in his conflation of everything into a unified (possibly homogenous) "worldly sensation".

However, confined to the terms set out by Hansen's application of Whitehead to twenty-first-century media, the coexistence of different modes of articulating the world is unproblematic, because human experience is enfolded into the world:

> Whitehead's work helps us to appreciate the irreducible sensory dimension of even the most inert, objectified or "data-fied" occasions of experience: literally swathed in a multi-scalar and dispersed sensory surround, our (higher-order) subjectivity acquires its power not because it incorporates and processes what is outside, but rather through its direct

[219] Fazi, 2016, pp.64-66.

> co-participation or sharing in the polyvalent agency of myriad subjectivities. Our distinctly human subjectivity is the result of a complex assemblage of overlapping, scale-variant microsubjectivities functioning distinctly and autonomously. Within such assemblages, these microsubjectivities can be said to exist in "operational overlap" with one another (where operational overlap, as we shall see, precisely does *not* mean "emergence").[220]

Here also, Hansen's analysis comes close to the notion of a machinic imaginary. The transsubjective relation between human and machine at the level of the social imaginary is the condition within which the subjective experience of the individual is possible. However, we part ways as fellow travellers as regards our respective analytic intentions. Hansen's focus is solely on the positive relation between computational media and human subjectivity, whereas the key problematic of this thesis is the negative relation. These two directions of focus, of course, are not mutually exclusive; to posit one is necessarily to implicitly acknowledge the other. Correspondingly, both the negative dimension and the positive dimension can be said to be productive, albeit in different ways. This productivity is more obvious in the case of the positive dimension discussed by Hansen: the "higher-order" subjectivity of the human is produced through the convergent overlapping of subjectivities. The negative relation, on the other hand, is productive on the level of the imaginary and a possible site of praxis. The discontinuities between the human imaginary and the machinic imaginary produces a productive excess of meaning that cannot ever be fully elucidated from *either* standpoint. (Computers have as much of a hard time understanding us as we have understanding them, which is why Tim Berners-Lee's dream of a semantic web has yet to come to fruition.)[221] Thus there is what we might call a fundamental ignorance of divergent modes of being towards one another (existential alienation). This produces what Árnason calls the "permanent riddle of the world", which requires the continual renewal of creative solutions to address.[222] Nevertheless, each solution will, in turn, always be an incomplete solution, producing more riddles, and thus sustain the tension required for the ongoing elaboration of meaning that articulates the world.

I therefore do not go as far as Hansen, who negatively characterises the anti-humanism of new materialism or speculative realism. Neither am I fully aligned with Hansen's particular brand of Whiteheadian media phenomenology. Instead I wish to maintain the productive potential of what Hansen contrariwise chastises as a "type of deterritorialized thinking":

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[220] Hansen, 2015, p.12.
[221] Berners-Lee and Fischetti, 1999.
[222] Árnason, 1992.

> not a thinking without the human, but a thinking in which the human figures as a component in some alterior or "alien" process operating according to its own logic, and emphatically *not* as the focus or the ground on which such a process can be materialized or made to appear.[223]

Hansen's argument is that if the world is to function as a ground on which human experience can appear, this must be necessarily *opposed* to the idea that human being is imbricated in a world of alien processes. But is this not a false binary? Why does the ground of experience need to be homogenous and fully isomorphic with all experience? This insistent monism can be avoided by developing the particular post-phenomenological perspective that found in Castoriadis, Árnason, and Adams, thus relinquishing computational media from a relation of identity with human experience. The idea that the world is a permanent riddle to be elucidated is precisely *because* the human figures as a component of 'alien' processes, which are *at the same time* the context within which human experience (the imaginary) articulates itself.[224] The tension produced by this disconnect is the driving force of creation that elicits meaning. World articulation *creates* meaning, ordering the world to create a coherent phenomenological experience. If the world were always-already coherent this would negate the possibility of change. The capacity for the world to be articulated in a coherent manner is the capacity for meaning to arise through a particular determination, but that determination is not pre-given and necessary. Rather, any articulation of a world is one possible determination amongst many that might arise due to the radically different possible modalities of interaction with the world (cultural, human, animal, plant, computational).

Hansen's critique of new materialism is aimed at correcting what he sees as an imbalance created by tipping the scales of agency in the direction of the non-human. He therefore instead suggests a neutral reading of the relation of the human and non-human with the aid of Whitehead. Yet, despite the dynamism of Whitehead's ontology, in the hands of Hansen, the continuum of "worldly sensation" reduces what might otherwise be understood as a plurality of modes of sensation.[225] Moreover, this is done simply to avoid the radical discontinuity and alterity he

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[223] Hansen, 2015. p.16.

[224] Waldenfels' *Phenomenology of the Alien: Basic Concepts* also provides a rich meditation on the concept of the alien, which encapsulates something altogether different to the concept of "the other." The alien "does not arise from a mere process of delimitation [of self and other]. It emerges from a process which is realized simultaneously as an inclusion (*Entgrenzung*) and an exclusion (*Ausgrenzung*). The alien is not opposed to the same, rather it refers to the Self (*αὐτός*, ipse), to myself or to ourselves, including the "sphere of ownness" ...from which it escapes. What is alien does not simply appear different, rather it arises from elsewhere. The sphere of alienness is separated from my sphere of ownness by a threshold, as is the case for sleep and wakefulness, health and sickness, age and youth, and no one ever stands on both sides of the threshold at the same time." (2007, p.7) I return to this in Chapter Seven.

[225] Harman, 2005; Latour, 2005.

detects in new materialism. Contrary to what Hansen proposes, however, we need not posit an undifferentiated continuum as regards the signification of sensation. As affirmed in Castoriadis' poly-regional ontology, genuine difference arises in being through the act of signification.

Hansen's emphasis on neutrality is, nevertheless, still intended as a complexification of what it means to be human without producing a fixed human/non-human binary. In this regard he concurs with the post-phenomenological position of this thesis, which argues for a recognition of the co-constitution of the human and non-human. The difference being that I maintain the genuine difference of the non-human emphasised by new materialism. My divergence from Hansen pertains to his focus on the totalising order of the cosmological, rather than my own argument for a multiplicity of worlds of which the cosmological is but one more world. Hansen suggests that human being permeates every corner of the universe, imbricated in the whole cosmos, rethinking subjectivity through Whitehead's concept of a superject:

> [F]aced with the reality that we are implicated in processes that we neither control, directly enjoy, or even have access to, we humans cannot but come to appreciate our participation in a cosmology of process, which is to say, to embrace our superjective implication in a plethora of processes of all sorts and at all scales.[226]

The shift from the sensible to the cosmological raises a question of the place of the socio-cultural as a distinct lifeworld of its own. In Hansen's account the socio-cultural is somewhat indistinct from either the sensible, the computational, or the cosmological, for they exist in a unified field of experience he calls "worldly sensation". It could be argued, nevertheless, that Hansen's account does not entirely preclude the possibility of distinction between different orders of this worldly sensation by necessity, rather he simply excludes the distinction in his analysis through a lack of engagement with different modalities of experience (as with his aversion to the notion of the concept of the alien). The superjective implication in different processes can be reframed as a transversal relation that is always partial and incomplete. The notion of transsubjectivity is a more explicit description of the transversality of the relations between different subjective modalities of world articulation. Transsubjectivity is therefore the preferred term in this thesis (also because of the connection to the phenomenological concept of intersubjectivity that it invokes, as discussed in the next chapter).

Ultimately, while Hansen sketches a picture of phenomenological experience in computational society amenable to the project at hand, he diverges in several ways towards conclusions and

[226] Hansen, 2015, p.17.

evaluations very different from my own. Although Hansen is ostensibly committed to a Whiteheadian pluralism, the image he conjures up is of a singular field of sensation that differs in varying orders of degree and complexity, but which remains fundamentally continuous. Whether this is due to his reading of Whitehead, or a problem within Whitehead's philosophy itself, is not a matter for discussion here (although I would argue it is the former). What is more, this leads to certain consequences in analysis of the ubiquity of twenty-first-century media. Despite his declaimer that he is not disregarding pre-mediatic sensation, Hansen seems to describe a situation in which human sensation has become fundamentally mediated by twenty-first-century media. If that were not the case, his thesis regarding the feed-forward effect as creating a dislocation in the operative present would not be as radically transformative of experience as it presumes to be. Arguably, mediated experience has not been homogenised by twenty-first century media, there are different forms and varying degrees of mediated and non-mediated experience. It is, therefore, worthwhile bringing an analysis to bear on the different orders of lifeworlds, rather than a singular cosmological order (which can instead be included in a multi-modal world relation). This shift in emphasis would make it possible to explain the differences in experience between the act of entering into more reflective relations with the mediated computational world, as opposed to the act of separating ourselves from it. Hansen's Whitehead-inspired media theory remains applicable to mediated experience, but it is not totalising in the manner Hansen leads us to believe. Experience is heavily mediated in contemporary digitalised culture, but we move through various degrees and kinds of technological mediation.

By the same token, networks of machine-to-machine interactions continue in a whirring frenzy without the immediate and direct influence of conscious human intervention. It thus makes more sense to address the differentiation between these orders of reality/experience. This thesis thus shifts the focus to a different scale of relations from the individual-cosmological towards the inter-worldly or trans-worldly, focusing less on the oneness of the cosmological and more on transversal travel across and between what Bernhard Waldenfels calls the boundaries of "domains of order".[227] Luciana Parisi has repeatedly argued that critical theory in the age of computation must be "concerned with the kind of knowledge originating from the techno-logic of machines, namely with how the medium filters the real and brings forward its alien vision of the world."[228] If such a critical theory is to be expounded, there is need to turn to theoretical positions such as the post-phenomenological that enable us to engage with interaction across

[227] Waldenfels, 1996. See also: Waldenfels, 2004.
[228] Parisi, 2019a.

boundaries of difference.[229] Before we can detail such a post-phenomenological method, an engagement with the work of Yuk Hui will enrich our thinking when we do finally arrive at the original methodology this chapter is proposing.

Yuk Hui's Phenomenology of Technology

Over the course of his first three books, Yuk Hui has provided a broad and fertile philosophy of technology built upon (although by no means reducible to) an encounter between Simondon and the phenomenology of Heidegger and Husserl. Consequently, there are many parallels to be drawn between his project and that of this thesis, as well as several crucial insights that can be learnt from his philosophy of technology. However, as was the case with Hansen, there are also key points of divergence in the framing of the problematics at stake concerning digital technology and, consequentially, the conclusions that follow. This difference largely comes from our respective readings of the legacy of phenomenology, his being a Heideggerian-Husserlian phenomenology that leads him to questions concerning the phenomenon of digital objects and the role of technology in the constitution of time.[230] Whereas by unpacking the implications of Merleau-Ponty's attempt at overcoming of the limits of phenomenology—which opened a path towards a post-phenomenology—my own research aims are concerned more specifically with the problematic of the world, and the question of meaning. The question of time is, nevertheless, still of vital importance to the study of world articulation and Hui provides valuable insights into recursion and contingency in contemporary media.[231]

When analysing Hui's work, the influence of Bernard Stiegler's philosophy of technology is vital for understanding his reading of Simondon with the phenomenology of Husserl and Heidegger. Stiegler and Hui have together developed a post-Husserlian phenomenology centred on the constitution of time by mnemotechnics.[232] Mnemotechnics are technology that function as external, environmental, and cultural memory supports that act as a tertiary form of retention in addition to the primary and secondary forms of retention described by Husserl in his theory of consciousness of internal time.[233] Stiegler argues that the human experience of time is made

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[229] Parisi, 2019a, p.39.
[230] "The industrialization of categories and algorithms has become the fundamental agent in the synthesis of time today." Hui, 2016a, p.248.
[231] Equally important, however, are Castoriadis' insights into the Hippocratic notion of time as *Kairos*, as opposed to *Chronos*. Time understood as *Kairos* renders time as the possibility for action, which is crucial to understand how time enters into the computation with learning. As machines gain the capacity to learn, they also gain the capacity to change what decision they make. See Castoriadis, 1987, p.212.
[232] Stiegler, 2011.
[233] Husserl, 1991.

possible by technological support though the process of what he calls (following Derrida) "grammatisation".[234] This co-constitutive relation of human being with technology is referred to as "originary technicity".[235] Although Stiegler's contributions to the philosophy of technology and media studies has been profound, the focus in this chapter will be on Yuk Hui rather than Stiegler. While remaining very close to Stiegler's original philosophical analysis, Hui has developed his own work in a direction that comes much closer in proximity to my own position. This is especially the case considering his more explicit engagement with digital technologies rather than the broader category of technics with which Stiegler is concerned.

In *On the Existence of Digital Objects*, Hui provides an ontology of what he calls "digital objects", which he argues constitute a digital milieu that serves as the ontological ground of phenomenological experience in contemporary digital society.[236] Hui describes these digital objects as a non-experienced dimension of experience. In his commentary in the foreword to Hui's book, Stiegler writes that the digital objects Hui describes share a similar status "with the scientific objects that emerge from scientific instruments".[237] Digital objects create a "programmable memory"; different from the 'technical objects' of Simondon or 'tools' of Heidegger in that the technical milieu of digital objects is a fully-programmable context. In highlighting the interactive dimension of the technical, Hui makes clear the extent to which the digital milieu is much more organic than other technical milieux, and its emergence has produced a phase shift in the process of collective individuation.[238]

In a similar vein, I wish to approach a discussion of this programmable milieu via Merleau-Ponty's notion of the inexhaustibility of the world, and ultimately move towards a post-phenomenological engagement with the imaginary articulation of worlds.[239] In arguing for a machinic imaginary and exploring its ramifications for socio-cultural critique, the world is understood as not simply given to perception, but also created or instituted as the social imaginary through the expressivity of social doing. The core of a critical project of reflective articulation is to engage with the programmability of culture in a non-technical sense, doubling the programmability of the social imaginary as it is instituted in and by technical infrastructure. I therefore agree with Hui's theoretical focus on programmability and recognise the utility of the concept of "tertiary protention" (explained below). However, his subsequent framing of this

[234] Stiegler, (n.d.) 'Nanomutations, Hypomnemata and Grammatisation'.
[235] Stiegler, 1998.; Derrida, 2002.
[236] Hui, 2016a.
[237] Stiegler, 2016, p.xi.
[238] Yuk returns to the concept of the organic in greater detail in *Recursivity and Contingency*, 2019.
[239] Emphasis on the imaginary dimension also avoids replicating an ontological difference between being and the world.

"tertiary protention" as a "new faculty" confines the analysis of computational media within the transcendental field of consciousness.[240] This creates difficulties for accounting for other non-human process, or subjective subtendencies, that participate in the 'programming' of worlds (discussed in below section on intersubjectivity).

Tertiary Protention and Imagination

Hui's notion of tertiary *pro*tention is the logical extension of Stiegler's concept of tertiary *re*tention.[241] Mnemotechnics function as a support for retentions external to the conscious subject and, therefore, provide a ground for temporal experience by forming a bridge for consciousness between temporally distinct moments. The example Stiegler uses is the technical recording of music allowing for repeat experiences that are phenomenologically different each iteration. Without the capacity to record, the difference in the experience of otherwise identical iterations of a musical performance would not be realised. Stiegler extends this to the cultural dimension, arguing that technology provides a tertiary retention that produces a unity between conscious experiences of individual subjects in a collective. Stiegler therefore maintains Simondon's thesis that technology provides the conditions for collective individuation and transindividuation, adding that the unity of individuation is conditioned on the temporal experience produced by mnemotechnics.

Hui's contribution is to argue that an analogical process takes place in terms of *protention*, i.e. the projection of conscious experience in the future. Hui argues that protention is an act of the transcendental imagination, supporting this claim with Heidegger's reading of Kant.[242] To explain Heidegger's reading of Kant very briefly, following Kant's transcendental deduction of time and space as a priori conditions of experience, Heidegger makes a second transcendental deduction that time is the ontological condition of experience (proposing an ontological rather than epistemological reading of the *Critique of Pure Reason*). The transcendental power of imagination is, according to Heidegger, the precondition of the synthesis of time because it is the faculty that synthesises the sequence of nows that we experience as internal time. It is therefore the primordial synthesis in that it creates what Heidegger calls *original time*.[243] Which is

[240] Hui, 2016a, p.240.
[241] Stiegler, 2011, p.16ff.
[242] Heidegger, 1997, *Kant and the Problem of Metaphysics*. This book was influential in Castoriadis's conceptualisation of imagination. However, Castoriadis adds a both a psychoanalytic and sociological dimension to the theory of imagination that leads to an important divergence from the Kantian account. The differences should become clear below.
[243] Heidegger, 1997, §31.

to say that the synthesis in imagination is not reproductive but *productive*, and it is only because of this power of the productive imagination that the synthesis of apprehension in intuition, and the synthesis of recognition in a concept (understanding) are possible.

Hui's notion of tertiary protention describes the way in which this synthesis of imagination functions through technological support. The orientation of consciousness is increasingly subjected to predictive algorithmic processes that analyse and produce "relations to pave the way for the experience of the next now or immediate future."[244] Unlike Hansen's feed-forward effect, however, tertiary protention is not Husserlian pre-predicative or predicative sense impression. Husserl's pre-predicative experience is a passive experience, whereas Hui describes tertiary protention as a "making-present" [*vergegenwärtigen*][245] in the Heideggerian sense of "bringing something forth into the now", a sort of intensification of "temporal-ecstatic relations".[246] Tertiary protention is in this way an orientation towards the world that provides meaning to action through the synthesis of relations. This synthesis of relations is a making-present of something distant and disparate in the future (a goal or a destination for example).

This feeds into Hui rereading Husserl's conceptualisation of meaning as instituted into digital objects. Hui refers to Husserl's subjective grounding of meaning in experience as forming the intersubjective relation from which objectivity can arise. For Husserl, subjective experiences are connected through mutual engagement with the shared meaning of objects in an intersubjective field. In "On the Origin of Geometry", he uses the term "institution" (*Stiftung*) to describe the historical process by which intersubjective experience becomes sedimented into the cultural lifeworld passed on generationally (Husserl's example being the axioms of geometry). Hui maintains this idea of the sedimentation of experience into an objective reality—like geometry—applies also to computational logic. The digital milieu in which human experience is embedded functions to synthesise and make-present relations that would otherwise not be possible. These relations become sedimented into digital objects creating what Hui refers to as "interobjectivity".

It is in these terms that Hui discusses the world of digital objects, contextualised within the Husserlian discussion of the world of cultural objects. Both Husserl and Hui maintain that objects have a world in that every object is a nexus of relations and potential relations. Equally, digital objects are fundamentally relational, and therefore have a world; a digital object is a nexus of relations and potential relations with other digital objects. This 'interobjectivity' functions as

[244] Hui, 2016a, pp.221–222
[245] Heidegger, 2002, p.212.
[246] Hui, 2016a, p.241.

the ground for intersubjectivity.[247] The relationality of the digital object—the interobjectivity of digital objects in a technical milieu—provides a network of relations to actualise intentional consciousness as the interobjective "we".[248] It is to this end that *On the Existence of Digital Objects* is directed towards an object-oriented ontology of the digital because it allows Hui to underpin phenomenology with the technological.

Hui regards this as mapping onto the technical in the following way:

> Knowledge systems, in this case of geometry or logic, become more and more rule based. In the context of a technical system, it is rather objects—technical objects, then digital objects—that become rule imposing. Certain systems tend to create short circuits of meanings that render engagements with technical objects superficial (e.g., simply pressing a button to start and stop an engine, repeating the same gestures on an assembly line).[249]

This concern with the damaging effects of technological automation, which Hui inherits from Stiegler, is tied into their preoccupation with intentionality. While this is a very valid concern with cultural and political implications for how we understand our relation to technology, it is also limiting for a philosophy of technology that wants to comprehend technology in itself, which is to say that it cannot fully engage with the in-itself of technological being. This limitation is inherent to the phenomenological method itself: Husserl's battle cry "back to the 'things themselves'"[250] refers to things as they are given in experience as they appear to intentional consciousness. This phenomenological approach to technology presents itself not only in Hui's diagnosis of the problem of short circuits, but also through the solution of a Husserlian foundationalism of knowledge in the 'kinestheses' of the living human body, which in relation to computation leads Hui to the interesting proposal that "digital objects don't obliterate experience, but they modify meanings."[251] In a very Simondonian move, Hui maintains that the task at hand is, therefore, to discover how we might "create a new condition of involvement" with technology, so as to "reactivate abstract knowledge" in light of the superficial engagement with technical objects that has been produced by processes of automation. Equally, I am concerned with precisely this attempt to create a new condition of involvement in relation to the modification of meaning by computation, the only difference being an emphasis on the

[247] *Ibid.,* pp.217–220.
[248] *Ibid.,* p.219.
[249] *Ibid.,* p.205.
[250] Husserl, 2001 [1900/1901], p.168.
[251] Hui, 2016a, p.205.

modification of meaning as the extension and multiplication of world(s) that overlap and intertwine without being captured within a phenomenological explanation of transcendental subjectivity.

Confronting this proposal of the modification of meaning along post-phenomenological lines reorients the evaluation of Hui's proposal of modification of meaning by digital objects. The institution of meaning is transformed though a post-phenomenological methodology that seeks to overcome Husserl through the Merleau-Pontian trajectory towards the concept of the social imaginary. As will be demonstrated below, a new set of problematics arises regarding meaning being modified—and even *created*—by computational processes because such a post-phenomenological methodology is prerequisite to thinking about meaning in a more expanded way that is not ontologically founded on human intentionality, *per se*. A major concern derived from this reorientation, for example, is whether the modification of meaning by computation produces meanings that exist beyond the horizon of human experience. Further to this, what is the significance of the social imaginary institution of machinic significations? Staying with a Husserlian phenomenology does not allow for such questions because Husserl's concept of meaning is tied to the act of judgement, as the fulfilment of an intentional act and therefore derived from experience.[252] For Hui computation is not experiential in the same way that an intentional act of consciousness is experiential. Accordingly, where Husserl correlates a propositional judgement of truth with a meaningful judgement of experience, Hui argues that a propositional judgement for a computer is "nothing but the technicization of knowledge" and cannot be correlated directly with a judgement of experience.[253] The logical operation of judgement of truth for a human is tied to experience in way that is not possible for a computer, which, Hui suggests, requires an development of formal logic to construct a phenomenological approach to computation.[254]

This is a fundamental difference between a post-phenomenology of technology, and a phenomenology of technology like Hui's. The difference partially stems from a focus on analysing computation in terms of the digital *object*, whereas I wish to focus instead on the computational processes themselves detached from the immediacy of the subject-object relation. A crucial distinction is that for Hui digital objects are just that: *objects*. Objects may have a degree of agency,[255] in the sense that they participate in process of bringing other objects and subjects

[252] Husserl, 1973.
[253] Hui, 2016a, p.206.
[254] *Ibid.,* p.207.
[255] It should be borne in mind, however, that Hui only uses the term agency three times in the book, twice referring to "human agency" and once, in somewhat critical tone, to reference to "a dominant trend in social sciences that

into relation, but he does not grant any subjectivity to the technical system. As a milieu, the digital is a dynamic integrated into the human processes of individuation and interindividuation.

In contrast to Hui's focus on the objective technological support of internal time-consciousness, this thesis is concerned with the question of subjectivity from the standpoint of the social imaginary. This refocuses the existential question of temporality to the social-historical dimension of being, treating it not simply as a background for individual subjective experience but as a broader temporal experience in its own right—i.e. the world of the social imaginary is a being for-itself that transcends individual experience. It is this analytical framework that motives an interest in the processes of subjectivity *within* the machine, and machinic subjectivity within the broader social-historical process. It is therefore necessary to introduce the third term *transsubjectivity* to refer to a broader mode of subjectivity that remains self-differentiated and composed of multiple modes of subjective subtendencies. Detailed justification and explanation for this turn from intersubjectivity to transsubjectivity, is discussed in the section on Merleau-Ponty and Castoriadis in the following chapter.

Accordingly my theoretical departure does not constitute a criticism as such, but rather a proposal for an alternative approach to computation that moves away from the phenomenological indictment to "go back to the things themselves" *qua* objects of consciousness. That is to say, I take a speculative approach to computation (in the Whiteheadian sense)[256] to investigate the implications of a mode of subjectivity operating beyond (although not necessarily completely withdrawn from) the circuits of human intentionality. By remaining tied to Husserlian phenomenology and thus not engaging with the subjectivity of technical processes, Hui's account underplays the active processes within computational systems that cannot be defined in terms of mere extension of conscious intentionality. Turning to the social imaginary is a minor corrective, or addition, to Hui's analysis, but one which highlights the potential for a more radical transformation of human experience than Hui is able to propose from within his theoretical framing. As Hui makes clear, human experience is constituted by the technical milieu; if this is the case then a divergence in the self-generative capacity of the technical has huge implications for the transformation of human consciousness.

The Organising Inorganic

In his book *Recursivity and Contingency,* Hui in fact moves much closer to the focus on the social-

sees objects as acquiring new degrees of agency in contemporary culture" (2016, p.41).
[256] Stengers, 2011.

historical. In this book Hui shifts his analysis to the evolution of technical systems. He does this via the prehistory of the philosophical discourse of the organic, and structures his argument around the concepts of recursivity and contingency. Hui's analysis of recursivity and contingency has direct consequences for my own methodological engagement with Hui's work because it is here that we are most aligned.

Hui's central claim is that the technical system of digital machines must be understood in terms of the concept of the organic. Hui provides a history of the concept of the organic from Kant's third *Critique* to through to cybernetics and to the digital technologies of today, arguing that this was an epochal shift in thought that replaced the mechanistic thinking of the early period of modern Western philosophy. Hui's definition of the organic is developed through the concepts of recursivity and contingency, which allows him to consider the philosophical roots of the organic rather than thinking the concept through the history of the biological sciences.

Hui describes recursivity and contingency as mutual processes: "Recursion is the movement that tirelessly integrates contingency into its own functioning to realise its *telos*."[257] They function together in this way in the self-organising movement of the organic, "the looping movement of returning to itself in order to determine itself, while every movement is open to contingency, which in turn determines its singularity."[258] As will be explored in Part II, this recursive function in computational systems has the effect of enclosing a self-referential world around certain computational processes and leads to the being-for-itself of the machinic imaginary. This self-referential world can be imagined with the figure of a spiral which "in its every circular movement […] determines its becoming partially from the past circular movements, which still extend their effects as ideas and impressions."[259] For this movement to be a genuine differentiation it requires contingency, not in the sense of an abstract conception of possibility but a genuine contingency that feeds new information into the system. Hui's formulation of recursivity and contingency echoes throughout my conceptualisation of the machinic imaginary. There is recursive referentiality to the machinic imaginary, yet contingency is ever-present because of the interactive dynamics of the contemporary computing paradigm.

Furthermore, Hui's discussion of recursivity intersects with the theory of the social imaginary to the extent that the latter can be understood as a region of being for-itself. Hui presents recursivity as the operative metaphor to describe the self-referential totality of the technical system as a superorganism. He argues that organicism and organology are the two necessary

[257] Hui, 2019, p.15.
[258] *Ibid.*
[259] *Ibid.,* p.4.

theoretical frameworks to comprehend the dynamics of the socio-technical world. "General organology", a term from the philosophy of Stiegler, is the study of the relations between psycho-somatic 'organs', technical 'organs', and collective individuations that constitute the broader process of transindividuation.[260] Organology connects the technical with the biological, which Hui uses to think through the history of organic thought towards a description of the technical system as the "organising inorganic".

In this sense, Hui's theory of the organic also applies to the large-scale socio-technical coupling that institutes the social imaginary (see Chapter Six). By stripping back the organic to the concepts of recursivity and contingency—rather than conventional biological definitions—Hui shows that it is possible to think through the ontogenetic individuation of technical systems, and places the technical alongside other organic systems. The analogical relation between technical systems and organic systems provides the premise upon which I argue that technical systems can participate in the institution of the social imaginary, the social imaginary is a recursive relation, which Castoriadis calls "being for-itself".[261]

Combining Hui's organicism with Castoriadis' poly-regional ontology, it is possible to argue that the technical is an immanent dimension of the creation of the for-itself of the social-historical world. Castoriadis presents a stratified schema of being for-itself that includes multiple regions of being: (1) the living being, (2) the psyche, (3) the social individual, (4) and society. Each region of the for-itself maintains a certain degree of interiority and closure from the whole, while at the same time participates in a sort of generic universality within the whole. Castoriadis adds two more regions, (5) human subjectivity, and (6) autonomous society.[262] These last two are distinguished by a self-reflexivity and radical openness that allows them to put their own creative being into question, that is, they have the capacity for *autonomy of self-determination*. As regards the technical dimension of the social, might we suggest the existence of a seventh region of being for-itself: (7) the technical? With software that can learn and programme itself (ANNs and genetic algorithms), and the autonomous functioning of technical systems on a large scale, such a proposition seems plausible. Crucially, however, even though we are referring to machinic *automation*, this seventh region of the for-itself is closer to those regions from (1)-(4) in that it is not autonomous in the self-reflexive sense of (5) and (6). The distinction being the difference between (auto-constitutive) autonomy of oversight and (auto-legislative) autonomy of determination. As Castoriadis explains, the term autonomy, as he uses it, designates "the state in

[260] Ross, 2018, p.19.
[261] Castoriadis, 2011. In Chapter Four I discuss being-for-itself in more depth.
[262] Castoriadis, 1997e, p.150.

which 'someone'—singular subject or collectivity—is explicitly and, as a far as possible, lucidly (not 'blindly') author of its own law." The implication being that "this singular or collective 'someone' can modify that law, knowing that it is doing so."[263]

Castoriadis' theory of being for-itself applied to technological infrastructure of the social world provides a productive context to repose one of Hui's central questions: "How is it possible to open up a pluralism when the organising inorganic is presenting itself as an alienating force, threatening to totalise the production of knowledge and the determination of rules?"[264] The rest of this thesis takes up a very similar question with the analysis of the machinic imaginary. Through the post-phenomenological position sketched out in this and the next chapter, the following chapters interrogate the problematic of interrogating the structures of meaning within the social imaginary in light of a pluralist approach to meaning. Moreover, in Part III I also highlight the alienating dimension of the machinic imaginary, but for different—albeit complementary—reasons to Hui.

An enquiry into meaning changes the orientation of Hui's question because it situates technology within a phenomenological world horizon as a subjective subtendency of articulation of significations. This differs from the concerns of Hui's analysis, which considers the technical system to be tending towards closure through concretisation. Hui seems to assume that the techno-cultural sphere of modernity is monological, in the sense that its cybernetic foundation means it will necessarily tend to convergence or "concretisation". At least, that is, to the extent that what he calls the "organising inorganic" is a technical elaboration or unfolding of a cultural logic that has been informed by a certain inseparable relation to modern technology; i.e. original technicity elaborated within a cybernetic logic, leading to a vicious circle of positive feedback.[265] It in is this sense that he claims that "technical concretisation is obscuring the cosmic reality, […] because technical and digital objects are becoming the ground of their own movements instead of the figure. When technology itself becomes the ground, then the cosmic reality is obscured, and the technological acceleration becomes the value of all values."[266] This is the notion of the singularity that develops from Pierre Teilhard de Chardin's concept of the "noosphere".[267] To avoid such an outcome, Hui proposes a move to pluralism at the level of technical systems, which he refers to as a "technodiversity".[268]

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[263] Castoriadis, 1997b, p.308.
[264] Hui, 2019, p.263.
[265] See Chapter 4 of Hui, 2019, *Contingency and Recursivity*.
[266] *Ibid.,* p.226.
[267] See Hui, 2019, p.219, but also pp.248–250 and p.264.
[268] *Ibid.,* p.263.

Here, once again, Hui's project closely approaches my own, but from an analytical perspective that differs in such a way to take us towards a different set of problematics and ultimate aims. His book *The Question Concerning Technology in China: An Essay in Cosmotechnics* is an excellent example of how we might go about constructing such a techno-pluralism. Hui disagrees with Heidegger regarding the impossibility of a metaphysics after cybernetics, instead maintaining that it is in fact possible to reconstruct metaphysics in relation to technology through a technodiversification. Analysis at this transcultural or trans-systemic level is precisely the post-phenomenological question Árnason engages with in his "civilisational" analysis.[269] To this extent Hui's work is congruent with the broader post-phenomenological approach to technology I am proposing to undertake in this thesis. As has already been made clear, however, the aim of this thesis is to show that the analysis of pluralism can be undertaken *within* the already existing technical system—what Hui calls the "organising inorganic". Hui on the contrary, regards the already existing capitalist technical system as being unchangeable, or at least caught within a loop that is very difficult to challenge because of its organic recursivity. The problem with this implicit acceptance of the notion of the singularity is that it forecloses the development of the current technical system according to a specified (non-technical) ground from which the genesis of technicity emerges: *culture*. Although Hui does not use the term culture and substitutes it with the term "cosmotechnics", he nevertheless describes the latter in terms of divergent (cosmopolitical) grounds from which the technical relation to the world emerges and is situated.[270] This replays the same issue that we saw in *On the Existence of Digital Objects*, in that the being of technology is grounded in the being of the human, only here it arises at the level of culture rather than in human consciousness. This is arguably because of the aforementioned Husserl-Heidegger-Simondon tripartite framing Hui's understanding of technology, and precisely why it is necessary to construct an alternative course through and beyond the phenomenology of Merleau-Ponty. That there is a socio-cultural dynamic to the expression of technology is beyond doubt, the socio-cultural milieu drives the individuation of technologies in local contexts. Exploring the machinic imaginary raises the question of the extent to which the technical and mathematical dimensions of computation create its own (cultural) ground. In other words, how does the organising inorganic become a being for-itself or, as will be considered below, how does computation articulate the world as a technical-computational problem? Hui does in fact refer to the self-grounding of techne but regards this as a negative process of

[269] Árnason, 2003.
[270] Hui writes that his reasoning for this change in terminology is to avoid cultural essentialism or ethnocentrism (2019, p.39), but it could be easily justified within the Simondonian framework according to which culture and technics are always coupled.

convergence towards totality. He therefore proposes a resolution to this problem of self-grounding through an exploration of the cosmopolitical origins and milieux of technogenesis.

Instead of emphasising the ground and the originary genesis of technicity in culture, a different approach to the problem Hui sets out is to unpack the self-differentiation of the being-for-itself of the social-historical (Castoriadis). That is, to investigate in what way the ground of technology itself is a dynamic, historical ground. Rather than the cybernetic expression of technicity acting as a self-domesticating force of convergence, whereby the concretisation of the technical system will lead to a historical canalisation (the singularity), I want to show that the driving force of the self-differentiation of social-historical being is in fact *further* differentiated by the becoming-technical of the social imaginary. This, I argue, is due to the radically different modes of abstraction and ordering of the world by computational systems compared to human-psychic collectivities. These different articulations of world converge in the institution of the social imaginary, but to the extent that the machinic imaginary and the human imaginary remain unintelligible to one another, certain social imaginary institutions are entirely human and others are entirely machinic. An approach to the analysis of technology though the framework of the social imaginary arrives at a very different set of questions and responses by beginning with a consideration of the self-differentiation of the social-historical. The post-phenomenological approach to meaning and lifeworlds recognises a space of meaning *beyond* the traditional phenomenological limit of the intentionality of human consciousness. Nevertheless, Hui's proposal for a cosmotechnics is compatible and complementary with my project to the extent that the analysis is focused on a different scale or set of relations. Moreover, Hui's concept of the organising inorganic provides a way to frame such an approach regarding meaning, by elaborating on the role of recursivity and contingency in both nature and technology.

To conclude this section on Yuk Hui's phenomenologically-inspired philosophy of technology—although not to conclude my dialogue with him—the main points of disagreement stem from the following. Firstly, his phenomenological approach to digital objects as mediations and extensions of the lifeworld of conscious (human) intentionality highlights separate methodological concerns to the post-phenomenological approach I am undertaking. Secondly, the influence of Heidegger in his thought, which leads him to a certain reading of Simondon, in relation to technology and the question of the ground. What distinguishes his conception of technology and the urgent problem to be addressed regarding the individuation of technological systems is summed up in the following passage from the final chapter of *Recursivity and Contingency*:

> The gigantic force of technology is auto-systematising at all orders of magnitude [….] The planetarization (in the sense of Heidegger) means the invasion of technology into all beings, rendering them standing reserves, like the general equivalence [….] The planetary convergence that we are witnessing today, and the governmentality that relies on recursive modelling, is no longer a metaphor, but is in the process of completing a superorganism in the sense of Teilhard de Chardin and Lovelock.[271]

Methodologically Hui's approach leads to a set of questions, renderings of the issues at hand, and solutions therein that differ to quite an extent from those of my research. Nonetheless, Hui contributes to this thesis through constructive dialogue and will be referenced again in later chapters. His insistence on a pluralistic approach to the question of technogenesis, and the tools he provides with the concepts of contingency and recursivity in his effort to attempt a synthesis of technology and nature, are implicit in much of the following.

Conclusion

This chapter has begun to define the analytical framework of the thesis. I have argued that it is possible to construct a post-phenomenological 'canon' from a range of thinkers whose work aligns with, or even directly follows from a trajectory of thought traced by Merleau-Ponty towards the limits of phenomenology. This argument will be examined in finer detail in the next chapter, with an exploration of the core concepts and problematics arising from a post-phenomenological perspective. In this chapter, however, a description in relief of post-phenomenology has been outlined though an analysis of contemporary examples of the phenomenology of technology. This served to highlight the continuities and discontinuities between a phenomenological and a post-phenomenological perspective, as well as to further distinguish the specificities of the theoretical enterprise of my own research project. Firstly, considering Hansen's speculative phenomenology, I aimed to demonstrate that, even when attempting to construct a more expanded apparatus of experience in the manner Hansen proposes, an insistence on phenomenological categories maintains the centrality of human experience. Nevertheless, the expansion of cognition and experience into technical apparatus aligns with my own argument that ubiquitous computing has the effect of reordering experience, albeit that technical infrastructure does not simply extend human experience and intention, but generates its own experiential world, or imaginary. Signification is environmental and relational, and therefore, the dynamic and autonomous properties of contemporary computing are

[271] Hui, 2019, p.233.

productive of a novel stratum of environmental signification that solely operate in machine-to-machine interactions. These machinic significations do not cross the threshold between machinic and human orders of sense, instead constituting a world unto their own, beyond any human horizon of meaning. Thus where Hansen emphasises the co-constitutive human-machine relation, this thesis is an exploration of the points of disintegration and divergence between humans and machines.

The phenomenology of technology developed by Stiegler and Hui also reassert the centrality of human experience, even while arguing for an ontogenetic account of technology on its own terms. This is demonstrated in Hui's earlier work, in which he develops an ontogenetic account of digital objects, yet ultimately, they serve as a form of tertiary retention, extending human intentionality in much the same way as Hansen's worldly sensation is an extension of human experience. Despite the differences in the final analysis, much of Hui's work attends to similar concerns as this thesis. As explained above, for instance, the notion of the organising inorganic is a useful concept that is returned to in Chapter Six in relation to large-scale machine ecologies, but which also resonates with the more generally discussed idea that the machinic imaginary is a being-for-itself (Part II).

The next chapter continues the development of the post-phenomenological framework began in this chapter, shifting the focus to an exploration of the core questions and problematics of post-phenomenology.

Chapter 3: Post-Phenomenology and the Enlargement of Meaning to *Physis* and *Techne*

Continuing the development of a post-phenomenological framework, this chapter turns to a closer consideration of the transformation of phenomenology that begins with Merleau-Ponty's exploration of the limits of phenomenology. Around this notion of the limits of phenomenology, other figures are found to be in allegiance, each working through a set of problematics that orthodox phenomenology is unable to adequately grasp. As mentioned previously, the post- signifies a development of phenomenological thematics and concerns rather than a refutation or rejection. In the simplest terms, post-phenomenological investigations such as those of Castoriadis and Simondon, but also Árnason, Suzi Adams, Bernard Waldenfels, and others, decentre individual subjectivity when attending to questions concerning concepts of experience, world, meaning, intersubjectivity/transsubjectivity, the alien, and so forth. Rather, post-phenomenology is concerned with the entanglement of multiple modes of experiencing and expressing the world, often emphasising difference and divergence as much as unity and continuity.

The point of this exercise is not to assert that this is the only definition of post-phenomenology, there are many ways in which one can transgress phenomenology.[272] Nor is it to suggest that such a label defines the totality of the work of those referenced. Rather, it is a *constructive* endeavour; an adventure of ideas exploring a particular route through this literature, picking up concepts, questions, and problems along the way. With these theoretical tools, a conceptual machine can be assembled for the purposes of examining the central proposition of this thesis that there is a machinic dimension of the social imaginary, and the resulting problematic that this entails for a critical project of reflective articulation. Moreover, it is not simply a matter of building this conceptual machine and putting it to work, but rather, its application has a recursive, autopoietic function, generating new tensions and problematics in the following chapters, thus requiring further conceptual engineering.

[272] For example, the post-phenomenology of Don Ihde and Peter-Paul Verbeek (Ihde, 1990.; Verbeek, 2005). The significant differences in their conceptualisation of post-phenomenology stem from a different reading of Merleau-Ponty, and their emphasis on technology as an extension to embodiment. This means they ultimately arrive at a very different post-phenomenological method to that proposed here. Thus, while in many ways intellectual allies, it is important to distinguish the inflection of our respective uses of the prefix post-.

From Intersubjectivity to Transsubjectivity: Merleau-Ponty, Castoriadis, Simondon

As has already been stated, the post-phenomenological reading of technology that this thesis is undertaking is staged through an encounter between Castoriadis and Simondon, with an emphasis on their relation to the thought of Merleau-Ponty. This reading of Castoriadis follows the work of Árnason and Suzi Adams, who have elucidated the post-phenomenological dimension of Castoriadis' philosophy of imagination and how it relates to the problematic of the world.[273] The aspect of Merleau-Ponty's thought most relevant to the post-phenomenological perspective outlined in this chapter (and deployed in this thesis) draws from his later ontological turn, and his realisation of the limits of Husserlian transcendental phenomenology.

In his later writings Merleau-Ponty attempts to overcome the residual subjectivism of his own thinking in *Phenomenology of Perception* (*Ph.P)* in order to approach the world *tout court*; what he calls the "problem of the world".[274] The world *tout court* is the world beyond the anthropic horizon of meaning of (human) consciousness, and it is here the world presents a problematic that points Merleau-Ponty towards the limits of phenomenological investigation. This turn to nature finds its fullest expression in *The Visible and the Invisible* (*VI*), but it originates much earlier in *The Structure of Behaviour* (*SB*), in which his search of the "structure of structure" enlarges the field of meaning to encompass "objective" nature by locating meaning in behavioural gesture and thus outside of consciousness as defined within humanistic parameters.

The establishment of structures of meaning beyond the consciousness of the human subject provides the premise for the defence of the thesis that there is a machinic imaginary that creates a world apart from that of the human (albeit fundamentally entangled and co-located). I posit that this as an original contribution of this thesis because it opens a path towards the critique of technology through phenomenology that diverges from the other paths drawn from phenomenology found in Hansen, Stiegler, Hui, and others. Once Merleau-Ponty's problematic of the world is laid out, I explore the way in which Castoriadis' philosophy of the social imaginary attempts to overcome this problematic though an elucidation of the dimension of being he terms the social-historical. Through a synthetic reading of Simondon and Castoriadis I propose the concept of transsubjectivity, and discuss why the concept of the social-historical requires updating to account for the place of twenty-first-century computational media. The methodological work of this chapter feeds forward into the theoretical expansion of

[273] Adams, 2011; Árnason, 2003.
[274] Merleau-Ponty, 1968, p.6.

signification and meaning to computational processes in the following chapter.

Merleau-Ponty and the Limits of Phenomenology

How do we do phenomenology after Merleau-Ponty? This is a question that one asks oneself upon reading *The Visible and The Invisible* (*VI*), a book that represents an unfinished flight of thought, cut short by the untimely death of its author. Merleau-Ponty's philosophical trajectory in his final book, and the working notes that accompany it, is concentrated with a yearning to get beyond the limitations of phenomenology (and the "ontological tradition" as Castoriadis will later say).[275] The arrival at this threshold of the capacity of the phenomenological 'attitude' is announced in the first few pages when Merleau-Ponty refers to the "problem of the world" as the course of direction. The problem of the world is not the skeptical doubt of the world as representation—doubt is not the problem for a phenomenology that begins with perception as a brute fact—the problem of the world, for Merleau-Ponty, is "to know precisely what the being of the world *means*."[276] Such an interrogation of the meaning of the being of the world requires, he argues, that along with "the naïve idea of a being in itself" we rethink all correlative notions "of a being of representation, of a being for the consciousness, of a being for man".[277] In this way he replaces the skeptics' problem of representation with the question of *meaning* as the focus for an ontological study of "world-being, thing-being, imaginary being, and conscious being."[278] This question of the world that elicits Merleau-Ponty's turn to ontology is implicit in phenomenology from the beginning. In the essay 'The Philosopher and his Shadow', Merleau-Ponty shows that the missing half of phenomenology is nature in its brute being, not as it is conceived of by science, but that which is the precondition for representation by science.[279] This problem is at the root of Husserl's phenomenology and has always haunted it. It is the problem of the mediation between the world of persons or mind and the world of nature: "What resists phenomenology within us—natural being, the 'barbarous' source Schelling spoke of—cannot remain outside phenomenology and should have its place within it."[280]

This "turn to the world" as the problem from which philosophy might take its course is not, however, a radical break in Merleau-Ponty's thought but a logical trajectory. The emphasis of the world horizon of the *Lebenswelt* is at the core of phenomenology; Husserl's concept of the

[275] Castoriadis, 1997c.
[276] Merleau-Ponty, 1968, p.6.
[277] *Ibid.,* p.6.
[278] *Ibid.,* p.7.
[279] Merleau-Ponty, 1964a.
[280] Merleau-Ponty, 1964a, p.178.

Lebenswelt—although inspired by Heidegger's notably bodiless notion of being-in-the-world—develops in relation to concept of the lived body (*Leib*), from which Merleau-Ponty's philosophy of embodiment is clearly indebted.[281] With this emphatic focus on the body, Merleau-Ponty's more sustained engagement with Husserlian phenomenology took him on a different path to Heidegger, the latter having broken with Husserl much earlier on with the development of an ontological hermeneutics.[282] Thus when Merleau-Ponty finally arrives at the moment when his phenomenology must turn into an ontological investigation, his orientation is necessarily different; the ensuing ontology of the flesh situates meaning in a radically different relation to being than that found in Heidegger. For Heidegger, the being of *Dasein* discloses the ontic relation to the world as a world of relations predicated on the ontological "wordiness of the world". This is the "ontological difference" Heidegger makes between beings or "entities" and the Being of beings.[283] Heidegger's ontology presupposes an inherent representationalism that mediates Being (leading Sartre to his concept of nothingness),[284] whereas in Merleau-Ponty we can find a refocusing of the problem of representation, in which being becomes *expression*. For Merleau-Ponty, being expresses itself multiply, rather than remaining concealed until revealed by consciousness. In this way, Merleau-Ponty attacks the subject-object distinction that produces a naturalism in which nature is placed outside of phenomenological reflection.[285] With the "ontology of the flesh" that Merleau-Ponty began to elaborate in *VI* there is an attempt to construct a ontology in which such a distinction is impossible because every subjective act implies a reversibility.[286] An often cited example of this reversibility is his description of touch, first mentioned in *Ph.P*: "When I press my two hands together, it is not a matter of two sensations felt together as one perceives two objects placed side-by-side, but of an ambiguous set-up in which both hands can alternate the roles of 'touching' and being 'touched'."[287]

This radically phenomenological ontology is Merleau-Ponty's attempt to escape the substantialism of the ontological tradition. However, whereas Heidegger had deconstructed metaphysics, declaring ontological study to be an inquiry into ultimate Being rather than particular ontic instances of being as entities, Merleau-Ponty's ontology is a rejection of any reductionism.[288] As a consequence, while his ontological enquiry follows Heidegger in that it is a study of being as such—or to use Merleau-Ponty's phrase "wild being", nature in the romantic

[281] Carman, 2012; Evans and Lawlor, 2000.
[282] Heidegger, 1962.
[283] *Ibid.,* p.31–32 [11–12].
[284] Sartre, 1993.
[285] On Naturalism: Merleau-Ponty,1964a, p.163.
[286] On reversibility: Merleau-Ponty, 1968, *The Visible and the Invisible.*
[287] Merleau-Ponty, 2002, p.106.
[288] Park, 1983, p.313.

sense, or the pre-Socratic concept of *physis*—he does not allow for a distinction between entities and "wild being" because entities thus conceived are the expression of being in all its variation. Merleau-Ponty's main objection to the ontological tradition is the incapacity of language to describe being in its entirety. Castoriadis maintains this critique when he argues that the ontological tradition hitherto has relied on set-theoretical-identitary logic, which is incapable of comprehending the fundamental creativity of being to the extent that it always thinks being as being-determined. Instead, the inexhaustibility of being means that any determination is one of a multiplicity of possible determinations.[289] As Merleau-Ponty writes in *Ph.P*, "the world is not a sum of things which might always be called into question, but an inexhaustible reservoir from which things are drawn."[290] This refusal of the possibility of reduction is aimed at breaking the ontological dualism of mind and body, consciousness and world, subject and object, and in doing so Merleau-Ponty's philosophy resists both the transcendental and empirical in favour of a "chiasmic" conception of thinking and being.

In this vein, Merleau-Ponty sought to overcome his earlier concept of the "tacit cogito", and in doing so ventures into a post-phenomenological terrain by moving beyond conscious subjectivity. The problem of the inadequacy of language to describe the world does not, however, lead Merleau-Ponty to turn away from language but rather pushes him to further consider the relation of our being in language to the meaning of the world, as he writes in a working note in 1959:

> What I call the tacit cogito is impossible. To have the idea of "thinking" (in the sense of the "thought of seeing and of feeling"), to make the "reduction," to return to immanence and to the consciousness of…it is necessary to have words (with their charge of sedimented significations, which are in principle capable of entering into other relations than the relation that have served to form them) that I *form* the transcendental attitude, that I *constitute* the constitutive consciousness.[291]

In a 1978 essay on Merleau-Ponty, titled "The Sayable and the Unsayable" (mirroring the visibility/invisibility dichotomy in Merleau-Ponty's title), Castoriadis discusses this question of language and its role in constituting the world in relation to meaning.[292] Castoriadis argues that Merleau-Ponty's "reversal of Husserl's thought" leads to an ontological centrality of meaning

[289] Similarly, Simondon's doctoral thesis on individuation (2005b) is a critique of hylomorphism and nominalism in favour of an ontogenic account of being as becoming. What Simondon calls the pre-individual is the inexhaustibility of undetermined being.
[290] Merleau-Ponty, 2002, p.401.
[291] Merleau-Ponty, 1968, p.171.
[292] Castoriadis, 1984c.

that can be found right though his philosophical development, for which *VI* is but the culmination.[293] Husserl's phenomenology is "reversed" because the idea that sense is given by the subject to a sign—*Sinn-gebung* [sense-giving]—is "derivative and secondary" in relation to the word as it is used in the expression of world.[294] The subject does not confer meaning on the empty sign, there is a "pregnancy of meaning within signs which could serve to define the world", yet the sign as it is uttered in speech or communicated in writing is the *expression* of the meaning of the word and world in each singular instance. Thus, even as early as *Ph.P*, Merleau-Ponty is developing his notion of reversibility that later becomes central to his ontological claims in *VI*: expression is an intertwining of subject and world. For Merleau-Ponty, "The subject is being-in-the-world"[295] which cannot be described as a constitutive sense-giving [*Sinn-gebung*] of the subject to a mute, meaningless world, as takes place in Husserl. Rather the subject's relation to the world is the expression of world: "The world is inseparable from the subject, but from a subject who is nothing but a project of the world; and the subject is inseparable from the world, but from a world that is itself projects."[296] Moreover, *expression is creation*, an idea Castoriadis extends to his social ontology. The sign, or language—which for Castoriadis serves as proxy for social institution in general—is equated with the world, which is already pregnant with meaning when the individual subject enters into relation with it. This is central to Castoriadis' claim that the world *qua* social-historical world *is* meaningful in its own right (being-for-itself). At the same time, the subject (or living being) articulates the world anew in the expressive gesture of speech. Therefore, as for Merleau-Ponty, so for Castoriadis: *expression plays an ontological role*—the social-historical is a continuous process of creation of and recreation of signification, *because of* the creativity of the expressive gesture of social activity (both speech and behaviour more generally).

Furthermore, Castoriadis' notion of the social-historical expression of being implies more than intersubjectivity in Husserl's sense, and in the ontology of *VI*, one can find a similar urge towards a more radical intersubjectivity, which I am here calling *transsubjectivity*. For Merleau-Ponty it must not be a question of

> examining what Being can indeed be before it be thought by me or (what amounts to the same thing) by another, what indeed can be the intermundane space [*l'intermonde*] where our gazes cross and our perceptions overlap: there is no brute world, there is only an elaborated world; there is no intermundane space, there is only a signification

[293] *Ibid.,* p.121.
[294] Merleau-Ponty, 2002, p.498
[295] *Ibid*., p.500.
[296] *Ibid*., 2002, pp.499–500.

"world"…[297]

Further evidence that Merleau-Ponty was reaching beyond the intersubjectivity of consciousness—towards *transsubjectivity*—can be seen in earlier unpublished working notes dated between January-June of 1958 for the lecture series he was preparing on nature.[298] This was less than a year before he began working on the manuscript that was to become *The Visible and the Invisible*, the first working note for which is dated January 1959. A comparison of the notes reveals that leading up to the preparation for writing a book on the implications of an ontology of intersubjectivity, he was engaging with Simondon's philosophy of nature and considering the pre-ontological conditions for such an intersubjectivity. The note on Simondon was part of the preparation for a third course of his lecture series on nature, which was concerned with the passage from nature (the pre-human) to symbolism, under the title *The Human Body and Its Symbolism*.[299] At the point of writing he would probably have been expecting to deliver the third course in January 1959 (as evidenced by the title of the note), however, it came to pass that the course was delayed by a year because he was allocated a reduction in workload in order to write *The Visible and Invisible* in the first half of 1959.[300] When the course on nature was finally delivered, mention of Simondon had disappeared, and there is not mention of the latter in *VI* or the accompanying working notes. There could, of course, be various reasons for this omission, and attempting to accurately reconstruct the thinking of a philosopher who was unable to complete a final draft his manuscript or oversee the publication of his lecture notes due to an sudden death is not the purview of this thesis. Rather than trying to unpack the philosophical profundity of a note about a "forgotten umbrella", to paraphrase Derrida,[301] I instead want to use these notes as an opportunity to find within Merleau-Ponty's thinking a route beyond phenomenology into a process-relational ontology. I want to show how, by starting from phenomenological concerns as articulated by Merleau-Ponty, one can use Simondon and Castoriadis to *construct* a post-phenomenology.[302]

In the very first of the *Working Notes* for *VI*, dated January, 1959, Merleau-Ponty writes: "Necessity for a return to ontology— —The ontological questioning and its ramifications: the

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297 Merleau-Ponty, 1968, p.48.
298 Two short pages of these notes were published as Merleau-Ponty, 2005, pp.41-42.
299 Merleau-Ponty, 2003.
300 Saint Aubert, 2005, pp.31–34.
301 Derrida, 1996.
302 Again, whether Merleau-Ponty would have gone as far as we are suggesting is not being evaluated here. What is of importance is that he points the way for thinking in this direction, as Castoriadis maintains that Merleau-Ponty's thought is "An exemplary case, not insofar as Merleau-Ponty affirms his programmatic intention to break with the traditional ontology and the egology that is consubstantial with it but also insofar as, in him, this intention was beginning to achieve realisation." Castoriadis, 1997c, p.275.

subject-object question, the question of inter-subjectivity, the question of Nature."[303] In the next entry, also written in January, 1959, he pens the note: "In showing the divergence between physics and the being of *Physis*, between biology and the being of life, what is at issue is to effect the passage from being in itself, the objective being, to the being of the *Lebenswelt*".[304] Compare this to the notes written in 1958, which, first of all, say to "Study Freudianism from its biological bias", after which he proposes to replace the mechanistic biology used by Freud with modern biology—as Simondon does—and "alter all of its psychological constructions."[305] From the perspective of the modern biology that Simondon takes as the basis of his philosophy of nature, "there is an idea of heredity as a prolongation of ontogenesis, of individuation…"[306] This is the historical constitution (in the broadest sense of the term that Castoriadis uses to refer to the institution of primary social significations) of the psychical domain of symbolism—the being of the *Lebenswelt* referred to in the 1959 note. Merleau-Ponty also notes that this is nothing less than a reformation of the concept of the unconscious: the unconsciousness of ontogenesis "does not mean that there exists of it a clear (unconscious) text whose appearance would be its *masking* [*déguisement*], but rather that by principle perception is imperception."[307] The reformation of the unconscious that he appears to be referring to is what will, a year later, become the "invisible". The explicit connection to Simondon, then, suggests that the invisible can equated with the pre-individual potentiality of nature prolonged though ontogenesis.

The next note from this date in 1958, however, makes a distinction between nature and history: "What there is in common between history and nature is that they are individuations—but they are irreducible *precisely for that reason*—Historical individuation is irreducible—."[308] Thus while it is possible to give an ontogenetic account of the constitution of symbolism—the human lifeworld and horizon of meaning that Castoriadis calls the social-historical world—we must take care not to fall back on a physicalist determinism that would naturalise symbolic life. To do so would negate any possibility of expression in the Merleau-Pontian sense. There is in Simondon a "borrowing from the pre-individual" but it is a notion of being as individuation, and therefore self-differentiated. Historical individuation is an example of the elaboration of being distinct from the physical elaboration of being. This is an ontology of *expression*, according to which being is differently elaborated in relation to the relative order or region of individuation, very much like the ontology of Simondon, but also that of Castoriadis.

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[303] 1968, p.165.
[304] *Ibid.,* pp.166-167.
[305] Merleau-Ponty, 2005, note [317], p.41.
[306] *Ibid.*
[307] *Ibid.*
[308] *Ibid.,* note [317]v, p.42.

The question is, then, from a methodological point of view, how can phenomenology think this ontology? The last remnants of any reification of human consciousness as ground must be removed in order to include a process of individuation of multiple horizons of meaning. The intersubjectivity of perception is not enough:

> Simondon's point of view is trans-perceptive: perception is for him on the order of the inter-individual, unable to account for the true collective—There is something true here: for all the problems with perception it is still the phenomenological attitude in the sense that Fink critiques it. We do not constantly perceive, perception is not coextensive with our life—Nevertheless, one no longer knows what one is talking about if one *places oneself* in the meta-perceptual. What is needed is a philosophy of the several [*à plusieurs*]. ([318]v, p. 42 *Chiasmi 7*)

By a philosophy of the several we might conclude that he means a pluralist philosophy of the transindividual, which underscores the importance of not reading the ontology of the flesh developed in *VI* as being a monist ontology, which some scholars have argued.[309] However, as Ynhui Park shows in an essay on the originality of Merleau-Ponty's ontology, it is not a simple choice between monism or pluralism. Merleau-Ponty is attempting to break with the whole ontological tradition, and therefore, oppositional categories like monism-pluralism, materialism-idealism, or realism-nominalism cannot contain this phenomenological ontology.[310] Regardless, it is not the aim of this thesis to attempt to present a definitive categorisation of Merleau-Ponty's ontology of the flesh. The aim is, rather to provide a post-phenomenological framework according to which computation can be placed within the order of being as a creative expression of world articulation. The topological stratification of being in Castoriadis and Simondon presents some post-phenomenological elaborations of Merleau-Ponty's philosophy that can help construct such a framework. In their own specific ways these two thinkers inherit Merleau-Ponty's insistence on the world by going back to the pre-Socratic concept of *physis* to question traditional ontology and understand the creative processes of becoming.

Physis

Whereas the concept of the flesh of the world is constructed from a philosophy that starts with perception and embodiment, Castoriadis proposes we start with dreams. By beginning a philosophical investigation with dreams—the imaginary in its most distilled form cut off from

[309] For example, Moran, 2013, p.356.
[310] Park, 1983.

the anchor of the perceptual world—we instantly cancel out the presumptions of reality as a given, a notion to which traditional philosophy has remained ontologically wedded for millennia. Even if reality is a modern concept in Western philosophy, as Chiara Bottici has shown, there has been analogous concepts such as the True or the Ideal at the very least from Plato onwards.[311] Accordingly, a dichotomy between reality and fantasy, the real and the irreal, being and nothing has persistently separated experience from the world.

For Castoriadis, by starting with the imaginary and upending traditional ontology, we begin by understanding the world not as a given but as an always-already ongoing process of elaboration of the potentiality of "the Chaos, the Abyss, the Groundless" (which Simondon calls the pre-individual).[312] For Castoriadis, as for Simondon, and arguably also for the Merleau-Ponty of the above working notes, the elaboration of the world is the endlessly creative articulation of *physis*—the pre-Socratic concept of the "power of generation that essentially resides in the continuous and primary element from which the physical and physiological segregation of unities is effected."[313]

The Ionian physiologists (Thales, Anaximander, Anaximenes) conceived of an undifferentiated element, which Simondon suggests was a notion of matter prior to the distinction between form and matter. To this element is added a dynamism they called *physis,* to explain change and development. The idea of *physis* is the "the power of development of states and of particular beings", it is the creative potentiality of nature out of which differentiation emerges as order.[314] The element is both "the substantial matter of beings and the dynamic cause of their appearance, because the element is at the same time substantial matter and source of *physis*, the power of heterogeneity […] There is no *physis* of a particular being, but only of the universal primitive element that diversified itself into states and beings."[315] Anaximander named this element *apeiron* from the Ionic Greek root *peras* meaning limit, end, boundary. The *apeiron* is the limitless, the unbounded element that is a substance without properties of its own, yet within which is the capacity of *physis* to be differentiated. Simondon and Castoriadis both argue that the notion of the *apeiron* was relegated to an inferior position beneath *peras* in the dominant tendency of Western thought. This original "ontological decision" prioritises the determinate, and equates being with being determined rather than to-be-determined. The determinate is the "hypercategory" from which set-theoretic logic and the centrality of identity are derived. This

311 Bottici, 2014.
312 Castoriadis, 1997a, p.311; Simondon, 2020a.
313 Simondon, 2005a, p.55.
314 *Ibid.*, p.57.
315 *Ibid.*

hypercategory is the reason ontology has always been thought of through the concept of the individual, to which individuation is subordinated.[316]

Accordingly, it is no coincidence that in note [318]v of January 1958, quoted earlier, Merleau-Ponty invokes Fink's argument that intentional sense-experience is not the fundamental problem of phenomenology.[317] Rather, the fundamental problem of phenomenology (according to Fink) is the world, but the world taken as a problem *for* phenomenology means interrogating the structure of structures that make possible the world as meaningful.[318] Phrasing this as a question: what is it about the world or nature that contains the potential to be determined as meaningful by the imaginary? Merleau-Ponty's turn to the problem of the world and turn to nature was influenced by Fink's cosmological thinking in which the "concept of the world is derived from Heraclitus's *physis.* [….] not [to] be understood as reified, but as something fluid and in motion.".[319] *Physis* is the structuring dynamic of pre-differentiated being conditioning the infinite possibility of determination. This concept of nature takes us beyond Husserlian phenomenology, leading to a post-phenomenology.

The Inadequacy of Intersubjectivity

For Husserl objectivity is grounded in the intersubjective world. Intersubjectivity is the condition of possibility for the transcendental subject, and it is because of this embedded relation of the subject within the intersubjective that the concept of nature is understood to be constituted.[320] Yet this tells us nothing about nature as *physis*, the pre-objective "brute being" to which Merleau-Ponty realises phenomenology must turn. We can reconstruct this movement in Merleau-Ponty's thought to see why the post-phenomenological attitude is the movement beyond the intersubjective to the transsubjective—the point of view of the "trans-perspective" as Merleau-Ponty describes Simondon's theory of individuation.

In *Ph.P*, Merleau-Ponty cites Fink's formulation of the phenomenological reduction as finding "'wonder' in the face of the world". The reduction is "consciousness of the world because it reveals the world as strange and paradoxical."[321] This strange and paradoxical experience derives from our experience of others, that is, *intersubjective experience.* As Moran notes, "the apprehension

316 Simondon, 2005b.
317 Merleau-Ponty, 2005, note [318]v, p.42.
318 Fink, 1981.
319 Schenk-Mair, *Die Kosmologie Eugen Finks*, 1997, p.11, cited in Elden, 2008, p.49
320 Husserl, 1960, §55.
321 Merleau-Ponty, 2002. p.xv.

of the other is an integral element in the overall constitution of the transcendent sensible world. Elsewhere, Merleau-Ponty claims that the 'I-other' problem is the same as the 'I-world' problem…the profusion of perspectives produced by plural embodied subjects actually belongs to the very being of the world."[322] Accordingly, by turning to ontology in *The Visible and the Invisible*, Merleau-Ponty aims to interrogate "the question of inter-subjectivity" alongside "the question of Nature".[323] He does so in order to show how intersubjectivity is not solipsistic, nor a "community of monads" joined together in the absolute coincidence of "transcendental intersubjectivity".[324] This permits an expanded notion of subjectivity beyond the traditional Cartesian subject. Merleau-Ponty is committed to providing an ontology of the world in which the consciousness-object distinction dissolves;[325] our embodiment acts as a bridge between ourselves and others, to touch is also to be touched and to be in contact with the world—unlike the Sartrean gaze under which the subjective being-for-itself (*pour-soi*) is reduced to an alienated objectivity seen as a being-in-itself (*en-soi*).[326]

Levinas' critique of phenomenological accounts of intersubjectivity—including that of Merleau-Ponty—is that they bring everything into subjective experience in which the other is reduced to the same.[327] Whereas for Levinas, the other is always in an asymmetrical relation of complete transcendence from the self.[328] However, the ontology of the flesh in *The Visible and The Invisible* brings everything into contact, with the premise that this should not be taken to mean a flattening out of all relations, a fusing together into a unified One:

> When I find again the actual world such as it is, under my hands, under my eyes, up against my body, I find much more than an object: a Being of which my vision is a part, a visibility older than my operations or my acts. But this does not mean that there is a fusion or a coinciding of me with it: on the contrary, this occurs because a sort of dehiscence opens by body in two, and because between my body looked at and my body looking, my body touched and my body touching, there is overlapping or encroachment, so that we must say that the things pass into us as well as we into the things.[329]

The intertwining of body and world creates a dehiscence, suggesting a pluralistic relational

[322] Moran, 2013, p.356
[323] Merleau-Ponty, 1968, p.165.
[324] Husserl, 1960, p.130[158].
[325] "The problems posed in *Ph.P.* are insoluble because I start there from the "consciousness'-'object' distinction" Merleau-Ponty, 1968. p.200.
[326] Sartre, 1993, p.364.
[327] Levinas, 1993.
[328] Sanders, 2012, pp.145–147.
[329] Merleau-Ponty, 1968, p.123.

ontology that is striving to express relations in a manner that does justice to the alterity of the world.[330] Another way to read this is that even if the flesh of the world is a united carnal being, the fact of perception, of expression, creates a splitting into multiple perspectives, different abstractions of the world. To know is also, always, to be known, thus there is no absolute knowledge, no absolute subject, only a *questioning subject*. Philosophy can only ever be an interrogation of being, it should never intimate that it can know being, as it cannot coincide with being in its totality. Philosophy is in error when it searches for essences (Husserl) just as it is in error when it attempts to fuse thinking with things (Bergson): "They are two positivisms" in which "philosophy is flattened to the sole plane of ideality or to the sole place of existence."[331] Both ignore the "problem of speech", and in so doing ignore "all mediation":

> That every being presents itself at a distance, which does not prevent us from knowing it, which is on the contrary the guarantee for knowing it: this is not considered. That the presence of the world is precisely the presence of its flesh to my flesh, that I 'am of the world' and that I am not it, this is what is no sooner said than forgotten: metaphysics remains coincidence.[332]

Bergsonian metaphysics-as-coincidence is avoided by taking seriously the splitting of being that takes place in language.[333] This mediation, this distance of which Merleau-Ponty speaks is created by our being in language (and our being in society).[334] Not in the sense that language totalises being and life, but rather that language is an opening onto the unspoken mute world. Language is the metaphor for the expression of being, whether that be spoken language or the "mute language" of the body—the "operative language which has no need to be translated into significations and thoughts". Moreover, philosophy is a language that speaks of language: "language can only be known though its exercise, is open upon the things, called forth by the voices of silence, and continues an effort of articulation which is the Being of every being".[335] Being in this sense is the *articulation* of being; it is not the ontological difference of Being and beings, but rather a "post-Cartesian" notion of *being defined*. Deleuze describes this expression of being through the apparent paradox "that 'what is expressed' *has no existence* outside its expression, yet bears no resemblance to it, but relates *essentially* to what expresses itself as distinct

[330] This echoes the very end of *Ph.P.* when he writes: "My life must have significance which I do not constitute; there must strictly speaking be an intersubjectivity; each one of us must be both anonymous in the sense of absolutely individual, and anonymous in the sense of absolutely general. Our being in the world, is the concrete bearer of this double anonymity." Merleau-Ponty, 2002, p.521.
[331] Merleau-Ponty, 1968, p.127.
[332] *Ibid.*
[333] Bergson, 1980.
[334] "Language is a life, is our life, and the life of the things." Merleau-Ponty, 1968, p.125.
[335] *Ibid.*, pp.126–127.

from expression itself."[336] In a different articulation of this idea, Bernard Waldenfels uses the metaphor of question and response:

> A question may be answered, a request fulfilled, but the asking and the requesting are not thereby fully extinguished, for the simple reason that the question would also have allowed for other answers, and indeed perhaps still does. Every question that is not nearly a prescribed one resembles a wound that never completely heals.[337]

Merleau-Ponty writes that being is the answer to our questions, however, in discussing imagination and the social imaginary as world articulation we might phrase it the other way around: *being is a question that can be answered with many responses*. No response has any preference over another, but there is a necessary linkage between the question and response. There is an indeterminacy of the response but that does not mean to say that there is no determinate relation at all. There is, furthermore, an asymmetry between the question and the answer, so that although there may be a reversibility, to use Merleau-Ponty's term, the relation is not as simple as logical equivalence. When Merleau-Ponty advocates a philosophy of interrogation he is making just such an ontological claim, which is at the same time also epistemological:

> The interrogative is not a mode derived by inversion or by reversal of the indicative and of the positive, is neither an affirmation nor a negation veiled or expected, but an original manner of aiming at something, as it were a *question-knowing*, which by principle no statement or "answer" can go beyond and which perhaps therefore is the proper mode of our relationship with Being, as though it were the mute or reticent interlocutor of our questions.[338]

It is through this emphasis on interrogation that we can move from Merleau-Ponty to a post-phenomenology that can account for the being of computation, that of computational abstraction as an articulation of being. Taking language in the broad sense of expression of being, as Merleau-Ponty does, why should we not extend expression to computational processes? As discussed earlier, Mark Hansen's worldly sensation already points towards such an understanding of computation. However, instead of positing a unified cosmological field of sensation, what are the ontological implications of focusing on the *aesthetic* difference between

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[336] Deleuze, 1990a, pp.333–335. For more on the relation between Deleuze and Merleau-Ponty see: Lawlor, 1998. And for an in-depth discussion of the paradox of expression in Merleau-Ponty see: Landes, 2013.
[337] Waldenfels, 1996, p.18.
[338] Merleau-Ponty, 1968, p.129.

the forms of sensation of humans and machines?[339] That is to ask, what can be learnt from a (post-)phenomenological interrogation of the difference between the abstractive modes of ordering the world?

Following such a line of questioning leads, in fact, to a "philosophy of the several". Merleau-Ponty sees in the "trans-perceptive point of view" of Simondon, that there is the need to go beyond intersubjectivity to understand the pre-individual relation of individuation in the physical or living individual, that there is a communality of the historical and natural in that they are both irreducible individuations.[340] As suggested above, Castoriadis' poly-regional ontology offers a similar critique of intersubjectivity. For Castoriadis, intersubjectivity is grossly inadequate to describe social-historical being, precisely for the reasons that Merleau-Ponty intimates in the 1958 working note cited above in reference to collective individuation. Castoriadis writes:

> Manifestly, the social-historical immensely transcends any 'intersubjectivity.' This term is the fig leaf intended to conceal the nudity of inherited thought and its inability to confront the question of the social-historical. It fails in this task. Society is irreducible to 'intersubjectivity'—or to any sort of common action by individuals.[341]

To draw an example from Merleau-Ponty's critique of Sartre, the social-historical institution of class is already present before one becomes aware of it, the social-historical is the condition of the "phenomenon of coexistence".[342] However, this does not mean that the social-historical is separate from individual subjectivities:

> The individual as such is not, however, 'contingent' in relation to society. Society can exist concretely only through the fragmentary and complementary incarnation and incorporation of its institution and its imaginary significations in the living, talking, and acting individuals.[343]

What Castoriadis calls the "inherited thought" of Western modernity cannot logically contain such a description; it is not formalisable within a set-theoretical-identitary (ensemblist-identitary or 'ensidic') logic or ontology that can only categorise within the terms of whole and part, ensemble and element. Such a relation exemplifies the problem of order; the desire for a single unified order is rationalisation at its most dogmatic and fragile. What Bernhard Waldenfels calls

[339] Parisi, 2013.
[340] Merleau-Ponty, 2005, note [318], p.42.
[341] Castoriadis, 1992, p.270.
[342] Merleau-Ponty, 1964c.
[343] Castoriadis, 1992, p.270.

the "shattering of the world", and Castoriadis calls the "world in fragments", is the epistemic realisation brought about by modernity that the world is a not unifiable within a single order. This is, for example, the problem that surfaces in the lack of unification of quantum physics and general relativity, or the failed attempt to construct a foundation for mathematics as proven by Gödel's incompleteness theorem. Thus, we see the emergence of attempts to construct multiply-ordered or poly-regional pluralist ontologies in the past century or so, such as that of Simondon and Castoriadis, as well as Whitehead, or Deleuze and Guattari, but also object-oriented ontology, and decolonial theories of the pluriverse.[344]

Transsubjectivity in a Shattered World

Taking the above as given and proceeding within the frameworks of poly-regional ontologies or multi-logics, as I am prosing, a new field of inquiry coalesces around the problem of the relation between regions or orders, much like the problem of intersubjectivity. In effect this simply shifts the problem from phenomenology to ontology, but this transposition opens a whole new space for reflection. A description of this problematic is given by Árnason in his critical extension of the concept of interpretation:

> The much-discussed transition from a closed world to an infinite universe can serve as a guide for the interpretation and the modern relation to the world if we conceive of it neither as a definitive farewell nor as an *ex post facto* incontestable transgression of boundaries but as the entry into a new configuration of problems.[345]

In a similar vein, Waldenfels discusses the 'traversal of boarders' as a new problematic pertaining to the multiplicity of orders (I return to this in Part III).[346] Locating this question within stratified, poly-regional ontogenetic accounts, as in the case of the philosophy of Simondon, raises the question of where does one order or mode of being end and another begin in a continuum of modes of being? A similar question applies to Castoriadis' ontology (although the continuity between the modes of being, as the above quote suggests, is more complicated than a continuum with only differences of degree, not of kind).[347]

Árnason address the problematic of interrelations between different orders or articulations of

[344] Cadena and Blaser, 2018.
[345] Árnason, 1992.
[346] Waldenfels, 1996; Waldenfels, 2011.
[347] Castoriadis' solution is to borrow the concept of *Anuulung*, or 'leaning on', from Freud (Castoriadis, 1987, pp.229–237). Whether this is entirely satisfactory is up for discussion, if simply because as a concept it remains somewhat provisional and not fully worked out in Castoriadis' writing.

the world in his work on intercultural worlds. As a sociologist working within the tradition of social phenomenology (or phenomenological sociology) commonly associated with figures such as Alfred Schültz, Árnason returns to Weber to reappraise the phenomenological issues at stake in the study of society with certain questions in hand taken from Merleau-Ponty. Árnason argues that reading Weber after Merleau-Ponty highlights the need to make an "implicit connection between the analysis of action as meaningful behaviour and the interpretation of culture as a meaningful patterning of the world"—a point lacking in Schultz's analysis.[348] This is an argument Merleau-Ponty makes throughout his work from *The Structure of Behaviour* to *The Visible and the Invisible*: that the world is experienced as a permanent riddle requiring elucidation. This is also the framework taken up by Castoriadis when he describes the role of imaginary significations as the answers provided to the specific questions society poses for itself in order to exist as a society, as a world, as culture:

> Every society up to now has attempted to give an answer to a few fundamental questions: Who are we as a collectivity? What are we for one another? Where and in what are we? What do we want; what do we desire; what are we lacking? Society must define its 'identity', its articulation, the world, its relations to the world and to the objects it contains, its needs and its desires. [….] These are not questions and answers that are posed explicitly, and the definitions are not ones given in language. The questions are not even raised prior to the answers. Society constitutes itself by producing a *de facto* answer to these questions in its life, in its activity. It is in the *doing* of each collectivity that the answer to these questions appears as an embodied meaning; this social doing allows itself to be understood only as a reply to the questions that it implicitly poses itself.[349]

Marx is the explicit reference and target in this section of *IIS*, with Castoriadis attempting to provide a theory of history that avoids the rationalisation of the life and activity of a society outside of meaning. (Meaning is otherwise rendered by such rationalisation as a secondary by-product of the life and activity of a society, i.e. the functionalist determination of the superstructure to the infrastructure.) Although Merleau-Ponty is not directly cited by Castoriadis in the above passage, it is nevertheless clear that the phenomenologist's insistence on the immanent meaning of action guides the manner in which Castoriadis thinks action and abstraction together in the notion of social imaginary signification.[350]

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[348] Árnason, 1993, p.93. I expand this idea up in the following chapter on machinic signification.
[349] Castoriadis, 1987, pp.146–147.
[350] For a detailed review of Castoriadis's intellectual encounters with Merleau-Ponty and the influence on his thinking see Adams, 2014. Adams argues highlights that Castoriadis wrote each of his two texts on Merleau-Ponty

Maintaining the metaphor of articulation as a question-and-answer schema, Árnason writes that Merleau-Ponty and Weber both provide a framework to study the institution of society as a response to the "world as a pre-given but problematic horizon that makes the questions inescapable and the answers contestable." The world is not experienced as a natural brute given, it is experienced as already interpreted, and, moreover, the interpretation is not homogeneous but radiates from a plethora of perspectives that do not completely cohere and often appear contradictory.[351] In this sense "the world appears as a trans-subjective frame of reference rather than a mere substratum of projections"[352] Following Merleau-Ponty means transforming the transcendental line of questioning to a "post-transcendental" theory of society and history as a transsubjective articulation of the problem of the world. To quote Castoriadis: "There would be no question of the world as a common world, and *no question would arise at all*, if there was not an indefinite number of private worlds. Just as there would be no question of truth, *alêtheia*, without the indefinite number of opinions, *doxai*."[353]

Árnason explores these ideas though a "civilisational analysis", in which he extends Castoriadis' theory of social imaginary significations as patterns of meaning to the macro-scale of different cultural traditions, world views, and symbolic networks. However, the transsubjective articulation of the world is not only an intercultural or inter-epochal question; the fragmentary character of the social imaginary is also an internal dynamic. One can also, I argue, apply a transsubjective analysis to the abstraction and ordering of computation *intra*-culturally, without having to step back into the register of the intersubjective.[354] Intersubjectivity is inadequate to describe relations beyond the inter-individual subjective relation of the collective, there are always contradictions and tensions at all levels of collective organisation from person to person, group to group, nation to nation, culture to culture. The transsubjective relation is more appropriate to describe the "metastability" of such organisational dynamics.[355] This transsubjective relation describes the metastable 'unity' of conflicting or irreconcilable articulations of the world driving the individuation of the social-historical. This descriptive capacity of the concept of transsubjectivity is therefore methodologically useful to describe the metastability produced by

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on the eve of a major ontological turn, first in the seventies with 'The Sayable and the Unsayable', and then again in the eighties with 'Merleau-Ponty and the Weight of the Ontological Tradition'.

[351] Constructive connections might be drawn here with Descola's (2014) work on multiperspectivalism.

[352] Árnason, 1993, p.92.

[353] Castoriadis, 1987, pp.338–339. As a side note, this line of argumentation is very much of the pragmatic approach of William James, who makes a similarly structured argument in defence of pluralism in: James, 1907.

[354] Of course this must be with the caveat that we need not be speaking about any particular cultural relation to technology *per se*. To the extent that there is a homogenous computational society in the sense of the globalised capitalist-colonial cultural imperialism of the so-called "West", there is also a *heterogenisation*. For a discussion of the local-global dynamics of homogenisation-heterogenisation see: Appadurai, 1990.

[355] Simondon, 2005.

irreconcilability between human and computational articulations of a shared social world.

Intersubjectivity is inadequate because with computation we are not confronted with the same problem of 'other minds' or other subjects, when we ask what the visible/invisible or sayable/unsayable is for the language of machines or machine vision—i.e. what it means for a world to be expressed computationally. Even if we are arguing that computational processes can be described on the level of subjectivity, this is a mode of subjectivity of a different order, that is, a mode of ordering and articulating the world that is radically divergent from the human-psychic frame of reference. At the same time, however, it a mode of articulation that takes places within the same social imaginary—the same *world horizon*—thus it "leans on" the same social imaginary institutions, even while creating them anew.[356]

Such questions regarding the traversal of regional boundaries can remain unexamined for the time being, to be addressed further in the following chapters. A more pertinent concept that emerges from a commitment to a poly-regional ontogenetic account of the world is that of the "transindividual" (Simondon) or "transindividuation" (Stiegler).[357] In Castoriadis, "social-historical being" is the equivalent term. For the reasons discussed above, "transsubjectivity" is the post-phenomenological rendering of transindividuation, and will be herein used to refer to the *transversal relation of subjectivities in the process of social-historical transindividuation*. Returning to the concept of subjectivity, at the moment of proposing to go beyond to the phenomenological emphasis on the conscious subject is not a contradiction. Rather it is an attempt to preserve the operative expressivity of subjectivity by transforming the problematic transcendentalism that Merleau-Ponty was trying to expunge from his thinking by the time of *VI*.[358]

Brian Massumi provides an excellent definition of such a notion of subjectivity in the following terms: "Something that has developed the systematic power to animate itself, that has a self-driving dynamism, that exhibits a vitality of becoming, qualifies as a subjectivity. A subjectivity is defined by its power to self-produce and vary. Subjectivities are always open systems."[359] Within these parameters it becomes possible to maintain that there is a subjectivity of computational systems, without having to posit a subject in the traditional sense, and without having to rely on a theory of consciousness or cognition, as is all too common within philosophy of mind and

[356] Castoriadis, 1987, pp.229–237.
[357] Jason Read adds "transindividuality" to this nomenclature in Read, 2016.
[358] My argument that phenomenology must become *post-phenomenology* is, therefore, offered as an attempt to answer Lawlor's question of whether phenomenology can survive its challenge by Deleuze and the post-structuralists. See: Lawlor, 1998.
[359] Massumi, 2018, p.59.

philosophy of AI.[360] The subjectivity of computational systems are in these terms analogical to—and to a large extent logically equivalent with—the subjectivity of Capital. That is to say that computational subjectivity is *process*. Furthermore, although it is possible to functionally analyse processes as a holistic actants, it would be a mistake to understand such an analysis of actants as providing an ontological insight when it is actually providing an epistemological perspective.[361] With this definition of subjectivity, understood within processual terms of open systems with tendencies, we are in a better place to describe the transsubjective and transindividual dynamic of computation in relation to the social imaginary. To quote Massumi again:

> The individual human-capital subject is an integration of a differential array of subtendencies. At the same time, the multiplicity of human-capital subjects cohabiting the field of life are themselves subtendencies composing the higher-order integration of the capitalist system. The capitalist process moves through the levels. It is *transsubjective* and *transindividual.*[362]

Appropriating Massumi's thesis on subjectivity and transsubjectivity for an analysis of meaning within the social imaginary, one can describe social-historical being as transsubjective, to the extent that it is a 'higher-order integration' of human-machine imaginaries. Each imaginary is an open system that articulates the world according to its particular logic and aesthetic mode of expression, be that human-biological or machinic-computational. The articulation of the world expressed according to a particular "magma" of imaginary significations pertains to the trajectories of the particular subjective tendencies.[363] Each world is instituted by the relations of signification that make sense according to a particular logic or instantiation of reason. Transsubjectivity is an overlapping but discontinuous plurality of subjectivities. It is the process by which meaning is integrated at the level of a social-historical process of transindividuation. From the post-phenomenological perspective, there remains a self-differentiation at the transsubjective level that maintains an opening to infinity that is phenomenological rather than ontological, in the sense of fundamental ontology. Of course, the post-phenomenological develops from an ontologisation of phenomenological themes but this is to be differentiated from the analysis of fundamental ontology that posits being before experience. According to the post-phenomenological perspective, experience is an ontological category and vice-versa: being is expression/articulation. Any sense of a fundamental ground of being refers to the primordial

360 Boden, 1996.
361 Massumi, 2018, p.60.
362 *Ibid.,* p.61
363 Castoriadis, 1987, p.343.

capacity for self-differentiation, such as the "pre-individual" referred to by Simondon, the radical imagination of Castoriadis, or the *physis* of the pre-Socratics.

This radical self-differentiation is why Castoriadis argues that the inherited ontological tradition of Western metaphysics is unable to describe the true being of the social-historical. The term social-historical in Castoriadis refers to a self-differentiation that is both synchronic and diachronic. Diachronic differentiation is the temporal, historical process of social change (ontogenesis in Simondon): meaning changes over time as new social imaginary significations become instituted within the social imaginary. Synchronic differentiation is the infra-social differentiation between the expressive tendencies of psyches within the social: every psyche partakes in and is constituted by the social imaginary, while retaining a monadic interiority that is never fully captured by the social imaginary. These monadic psyches are expressed as social individuals (which could be equated with Deleuze's concept of the "dividual").[364] Simondon's concept of metastability is another way to conceptualise this synchronic differentiation. In Simondon the metastable state of a system creates the necessary conditions for ontogenesis:

> Individuation must then be considered as a partial and relative resolution that manifests in a system which contains potentials and includes a certain incompatibility with respect to itself, an incompatibility that consists of forces of tension and the impossibility of an interaction between the extreme terms of the dimensions.[365]

Computational society understood as the becoming-technical of the social imaginary entails an expansion of both synchronic and diachronic self-differentiation, which will be explained in relation to machine learning in Part II. *Diachronically*, the change relates to the cybernetic temporality that both Hansen and Hui argue is produced by twenty-first-century media (feed-forward, tertiary retention and protention). Furthermore, difference is produced within the social imaginary by the directionality of the process of abstraction within learning processes, which create social imaginary significations of a machinic order. The technical system is a cybernetic feedback loop, producing social imaginary significations that recursively feedback through fields of action in the form of decisions. A process of sedimentation of imaginary significations produced by the autonomous or semi-autonomous machinic processing of the social world takes place, driving the machinic imaginary further from the initial intelligibility of human networks of meaning. It is in this sense that recursivity, as discussed by Hui, produces a tendency towards concretisation of the technical system (towards its auto-constitution as a being-for-itself). There

[364] Deleuze, 1990b.
[365] Simondon, 2020a, pp.3–4.

is, moreover, an irreversibility within this technical process. In other words, there is a genuine *historical* dimension of the technical, which has shifted into a new phase with digital computational technologies.[366] This shift has taken place because of the introduction of learning as a core process of computational mediation and automated capitalist production. Learning has deepened the historicity of the technical system, as Hui's updated account of technogenesis shows. For this reason, learning is a vital area for techno-cultural analysis (as attested to by the current outpouring of cultural analyses of machine learning).[367] My analysis of learning will, however, be wider than the specific technique known as 'machine learning', broadening the concept of learning to account for the wider process of sedimentation of machinic significations into social imaginary institutions.

Alongside an analysis of the diachronic, it is imperative to interrogate how the becoming-technical of the social imaginary (this new historical phase of the social-historical) produces a novel *synchronic* differentiation that was not present before the above-mentioned concretisation of the machinic imaginary. Learning is again the core of this shift because what learning means in the context of the machine at a systematic/socio-cultural level is the creation of a world, in the post-phenomenological sense, that is fully machinic. Part II will demonstrate how this is the case, but for now it will suffice to note that learning and interaction in computational media open a series of questions concerning the relation between the human and machinic orders of signification that co-constitute the social imaginary. In doing so I will further define and defend the concept of transsubjectivity. From there it will be possible to open onto a post-phenomenological exploration of the ethical regarding the traversal of orders, in conversation with Waldenfels' phenomenology of the alien (Chapter Seven). After all this groundwork, in Chapter Eight it will finally be possible to consider the implications of a technopolitics integrated with a praxis of reflective articulation as advocated by Castoriadis. In doing so, I hope to show how such a politics is not a simple task, however, because autonomy, as the defining concept of modernity, is called into question by a novel existential alienation produced by the machinic imaginary. As such, the latter is an upheaval in the dynamics of social-historical transindividuation and constitutes a new phase of history.

Conclusion

Drawing this first part to a close, a summary of the terrain covered thus far and a note on the

[366] I return to this in the conclusion to Part II.
[367] Examples include: Mackenzie, 2017; Reighluth and Castelle, 2020; Domingos, 2015; Underwood, 2015.

structural function of Part I and its component chapters is in order. The aim of this thesis is exploratory, in speculating upon the existence of a machinic dimension of the social imaginary, the conclusion being that this constitutes a reordering of the conditions of social-historical creation, which entails a series of problematics requiring further elucidation. Such an elucidation takes place in both the theoretical space of abstract reasoning, such as this thesis itself, related research endeavours in the scholarly community, and public discourse, but also in the practical lived experience of society as it continuously recreates itself in response to its own activity. That is, social-historical creation is the ongoing processes of the auto-interrogation of the question of what society is, expressed in social activity, which includes both action and abstraction (praxis). The machinic imaginary is a new expressive mode of social activity, combining reason (*legein*) and techne (*teukhein*). It too participates in the auto-interrogation of the question of what society is, answering through the articulation of a world determined by the non-human expressive mode of computational logics.

Part I has presented the theoretical context of this explorative research aim, both in terms of its critical project and philosophical framework. This first finds context within an existing discourse concerning the reordering of society by computational technology and the ensuing technopolitical responses to the situation. In Chapter One, a range of literature was surveyed to draw out the range of critical projects that emerge in the analysis of computational society. On the one hand, are those that begin from a critique of technology. The determinate, servo-mechanic cybernetic model of technology within much of this literature resolves into technopolitical frameworks that equate technology with governance, sovereignty, or a totalising system tending towards a cybernetic singularity. On the other hand, critical theory that engages with a more open-ended image of social-historical institution, often lacks direct engagement with the technological except to the extent which it is determined by psycho-social forces of human activity and imagination. This crudely constructed dichotomy between technopolitics and the politics of the imagination serves to highlight the aim of this thesis as a synthesis of underlying themes within both: that technology is a *creative force of determination* in the open-ended creation of the social-historical world.

The following two chapters of Part I supplied further theoretical context, developing a philosophical framework to speculatively investigate the notion of a machinic imaginary as a process of non-human worlding. Central to the development of this framework is the introduction of the initial philosophical problematics of the thesis drawn from a reading of post-phenomenology, namely: 1) the post-transcendental development of the core

phenomenological question of the world; 2) an expanded understanding of experience and meaning beyond human subjectivity; 3) the inadequacy of intersubjectivity for an expanded phenomenological investigation into divergent articulations of world, which is replaced by the concept of transsubjectivity to account for a transversal relation within ontological difference; and 4) the ontological function of expression as a process of world articulation and the creative force of the radical imagination, understood as an ontological determination of *physis*, which I argue includes *technē* as well as *poiēsis*.

Chapter Two began the process of determining what I intend by the term post-phenomenology, and how the latter converges with, and diverges from, contemporary phenomenology. As the focus of this thesis on technology, the examples were of contemporary phenomenology of technology. The extended analyses of the work of Hansen and Hui provided an opportunity to present some key thesis statements of my own. For example, the environmental and relational attribute of signification, similar to Hansen's description of sensation as environmental and extended into technology, and the consequences of ubiquitous computing for the question of experience. I distinguished my theoretical focus from his understanding of technology as an extension of human experience to highlight my interest in the *negative* relation of different fields of experience within a transsubjective social-historical field. Hui's work was subject to a similar critique of the anthropocentric emphasis in his phenomenological account of technology. However, his concept of the recursive organising inorganic was called to attention as a helpful framing of the structure of the being-for-itself of the machinic imaginary. This auto-poetic and self-grounding process is the source of concern for any critical project that intends to shape its development, and therefore a core problematic of the machinic imaginary carried forward into the later parts of the thesis.

Finally, in Chapter Three, the post-phenomenological methodology was presented drawing primarily from those thinkers writing in the wake of Merleau-Ponty's discovery of the limit of phenomenology. The discovery of that limit demanded of phenomenological philosophy a shift to ontology but, unlike the Heideggerian ontological turn, those developing Merleau-Ponty's position favoured an ontogenetic or process-relational account of existence. In each case these thinkers searched for answers to the question of how the world comes to be articulated as a world: Simondon, for example, explored the problem of individuation, and Castoriadis developed a process philosophy of the social-historical through a notion of the imaginary.[368]

[368] As mentioned already mentioned, beyond Cornelius Castoriadis and Gilbert Simondon, who will be treated in more detail in the next chapter, thinkers who explore the post-phenomenological focus on the *transsubjective* character of meaning and world articulation include: Árnason (1992; 1993; 2003), Suzi Adams—both of whom

Such post-phenomenological analysis is, in other words, concerned with the articulation of being as it is expressed by beings' experience of being. This methodology is an attempt to find the conceptual language to describe the creation of worlds as they are articulated according to any particular mode of being. It was argued that intersubjectivity is inadequate to describe this new social-historical constitution because it is unable to account for the fragmentation of the world without falling into a transcendental analytic, instead transsubjectivity is a more useful concept. The implications of this idea will be further developed in the coming chapters. Accordingly, this thesis speculate upon the emergence of a new articulation of being, that of the machinic imaginary, which has development from computational infrastructure and machine learning. Phrased differently, my argument is that the machinic imaginary is a radically non-human expression of the mode of being of computational machines. To consider the stakes of this ontogenetic emergence of a new mode of being within the social in Part III, the function of Part II is to define and describe the machinic imaginary. Chapter Four will provide the philosophical groundwork for the description of this speculative 'object', and further unpack the post-phenomenological proposition that computer models and computational systems articulate a world. Simondon's concept of information will be compared to Castoriadis' concept of signification with the aim of incorporating the insights of the two thinkers into a theory of machinic institution of social imaginary significations. Chapters Five and Six will then present an 'empirical' description of the machinic imaginary through a historical narrative and general discussion of the technological conditions in which the machinic imaginary is emerging.

directly reference Merleau-Ponty and have a conception of post-phenomenology; Bernard Waldenfels (2011); and I would argue we can also read Franz Fanon's (2008[1952]) concept of "sociogeny", and Sylvia Wynter's (1999) development of Fanon, as post-phenomenological.

Part II

Chapter 4: Theorising Machinic Signification

Introduction

Post-phenomenology provides the necessary theoretical tools to understand the concept of the machinic imaginary. Yet at the same time, the machinic imaginary is also a concept that can only come after further transformation—further individuation and self-differentiation—of post-phenomenology, as is thematic of the method itself. Namely, when post-phenomenology encounters contemporary technological modes of being in the world, the latter function as a problematic that post-phenomenology must resolve by incorporating it into its functioning through a series of interpretive steps. The latent anthropocentrism in Castoriadis and others, and the inability to conceive of meaningful worlds generated by inert silicate matter, is the initial problematic that arises from an encounter between post-phenomenology and computation. Nevertheless, the resolution to the problematic exists *in potentia* in the theoretical propositions of Castoriadis and other post-phenomenological thinkers. This potential exists in these philosophies because they are all in effect gesturing towards a poly-regional ontology that does not logically necessitate human being as an axiomatic mode of being for the existence of a world. Accordingly, Part II enacts the playing out of this encounter between post-phenomenology and computation. More specifically, the encounter is with contemporary digital technologies that broadly fall within the category of machine learning and computational systems that have machine learning embedded into their functioning. Through this encounter the post-phenomenological position will be further refined.

Much like the concept of intelligence, the concept of learning obscures fundamental differences between the set of techniques clustered under the banner of 'machine learning' and what is called learning in humans. As Bones *et al.* note, human learning is a complex set of processes and outcomes defined in various manners—in pedagogy and cognitive science—that exceeds the much simpler processes that called machine learning.[369] However, I still use the term machine learning to interface with the literature without constantly having to substitute a different concept every time. That being said, if one were to strip away the metaphorical language of 'artificial intelligence' and 'learning', a more technically-accurate description of machine learning as it is used in the literature might be: *a gradient descent towards an optimisation function*. What is being 'learnt' are mappings of the most optimal solution to a given task through repetition of that task,

[369] Bones, *et al.* 2020. See also on this point: Pasquinelli and Joler, 2020.

with changes to the model at each iteration.[370] When a learning machine maps a problem space it distinguishes a pattern in the data. This pattern recognition is the process of proto-signification and will be discussed in more detail below and in the next chapter. It is in this sense that machine learning can be understood as a *patterning*.[371] The patterns generated in the activity of machine learning serve as the material by which the world comes to be articulated by machines.

While on the micro-level there are machine learning techniques through which AI researchers attempt to build 'intelligent' systems from the bottom up (programs that program themselves), at the macro-level there is a 'learning'—or perhaps better an adaptation—that takes place in the large-scale machine ecologies of the "big data society",[372] like the finance sector, social media ecologies, or the technological assemblage of global and national security apparatuses and logistics networks.[373] This latter category 'learn' in the very loose sense that they are driven by ecological dynamics of optimisation strategies adapting to one another and their environment.[374] These machinic ecologies include the full spectrum of technical elements, individuals, and ensembles.[375] Thus, we might refer to these large-scale dynamics as a broader category of 'machine learning', because machine ecologies are assemblages of machines that make up larger *social machines* which function and exist at a social level. The gradual adaptation of machine ecologies is a process of socialisation or *institution* of computational reason: it is general, osmotic, and in large part undirected by any specific individual or individuals. That is, the institution of social imaginary significations is the reification of social relations embodied in computational infrastructure. Just as language is a system of formalised relations that have sedimented from the embodied relations of the world, so pure ideas and abstract entities—like data structures, vectors, arrays of integers, or an adjacency matrix—are the differentiation of the sensible world into the silicate material of the hardware and the representational structure of code. At the same time, the patternings of machine learning influence this process of institution and become social imaginary significations as machine learning is embedded into computational systems in the

[370] The way this mapping is encoded differs according to the technique used (e.g. ANN vs logistic regression).
[371] Árnason, 1993, p.93.
[372] Kitchin, 2014.
[373] Cowen, 2014.
[374] The understanding of learning as adaptation is supported by Kennedy, Eberhart and Shi, 2001, *Swarm Intelligence*, p.402–403: "From the perceptive of computer science, learning is what an entire intelligent system does. Learning thus applies to the entire intelligent system, while adaptation mainly applies to the portion of the system that we are addressing in this book: the area where computational intelligence is relevant. [....] In summary, from the perspective of computer science and engineering, adaptation is arguably the most appropriate term for what computational intelligence systems do. In fact, it is not too much of a stretch to say that in computer science and engineering, computational intelligence and system adaptation are synonymous."
[375] Simondon, 2016, *On the Mode of Existence of Digital Objects* (*MEOT*). For definitions of these terms, see Chapter Two of *MEOT*.

world.[376] In other words, the machinic imaginary is both *instituted* and *instituting* (likewise, social imaginary 'institution' should be read as both a noun and a verb.)

In developing the concept of the machinic imaginary, this chapter will introduce the concepts of information and signification drawn out of a synthetic reading of Simondon and Castoriadis. The concepts of information in Simondon, and of signification in Castoriadis, can be understood to describe the same relational ontology that allows us to conceptualise the process of the institution of the machinic imaginary.

A post-phenomenological reading of Simondon's and Castoriadis' theories of signification and information enables an exploration of how signification occurs in different realms of being, from psycho-biological organisms to machines. The question of signification, explicitly central to Castoriadis' thinking, is not foregrounded in Simondon's analysis. It nevertheless remains a key concept with which Simondon thinks, and without which one cannot fully understand his theory of individuation.[377] Moreover, Simondon's concept of information opens a space for thinking about value and signification as a form of relation in the technical articulation of the world. Information is a concept he derives from technical thought and applies to his philosophy of nature and society, and thus functions across all strata of his poly-regional ontology.

The development of Simondon's thinking on this topic begins with his description of vital individuation in 'Part II: The Individuation of Living Beings' of *Individuation in Light of Notions of Form and Information* (*ILFI*).[378] Moving through the different regions of being, he goes from biological organisms towards psychical individuation and then, ultimately, to collective and social individuation and the concept of the transindividual. It is in these latter stages that the role of technology as its own constitutive mode of being begins to play its most significant role, so much so that he dedicates the focus of his supplementary thesis to the mode of existence of technical objects.[379]

Castoriadis provides a more explicitly political theory of signification at the level of the social than Simondon. By reading Simondon through Castoriadis, I align myself with thinkers like

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[376] Dieter and Tkacz (2020) make a similar argument when describing how the merging of security practices into everyday financial activities in the design digital banking apps produces patterns of behaviour and expectation "that once stabilized […] become available for reuse and for wider circulation (beyond banking), precisely because they allow for repetition and adaptation." In other words, they are instituted as social imaginary significations.
[377] The question of signification is most explicitly stated in Part II of *ILFI* on psychic and collective individuation and in texts such as "Values and the Search for Objectivity" (Simondon, 2020c), and his lecture series *Imagination et Invention* (2008).
[378] Simondon, 2020a.
[379] Simondon, 2016. To fully understand Simondon's philosophy of technology it is vital to engage with his philosophy of nature, as the former is an extension of the latter (a reading shared by Mark Hayward and Dionysius Geoghegan, 2012).

Jason Read, who attempt to extract a politics from Simondon.[380] For Castoriadis, the question of signification is the central focus of his theory of the social which includes psychic and social individual regions of being. It is only later, when he shifts to a consideration of philosophy of nature, that we find an extension of his theory of the imagination and signification into the individuation of the organism.

A logical continuation of Castoriadis' poly-regional metaphysics of imagination can, I argue, encompass the quasi-autonomous dimension of technical individuation found in Simondon. However, this only becomes clear when reading Castoriadis 'in reverse', so to speak. That is, I propose to interpret Castoriadis' earlier writings in light of the poly-regional philosophy of nature he developed in his late work (see below). It is in his later writings that the ontological significance of the imagination is given its full weight in describing the manner in which an imaginary is articulated in the relation between an organism and its environment. Castoriadis' notion of signification expands beyond anthropocentrism to a relational ontology, facilitating a post-phenomenological description of the articulation of worlds at various strata of being. A remarkably similar argument is made in Simondon regarding his theory of the image cycle (discussed below), in which he locates the origination of the signification in the simple organism. In both cases *signification is a mode of relation*, which I suggest can be extended to machines, especially to complex computational systems integrated into social life.

It is by reading this later work of Castoriadis that one can see more clearly how close these two thinkers are. Castoriadis' later thinking, which extends his theory of social imaginary significations into a philosophy of the organism, mirrors the movement found in Simondon from nature to technical society. While they each begin their analysis from a different stratum of reality and have different end goals, their poly-regional ontologies can be mapped onto one another. They both argue that there are multiple regions[381] of being from physical, organic, psychic, social and transindividual/social-historical, which are described in non-substantialist terms, and relate to one other ontogenetically. Unlike Simondon, what Castoriadis does not provide is an adequate bridge to the mode of being of technology. Instead, in a somewhat orthodox Marxist fashion, he simply locates technology within the social as a product of human labour without any real ontogenetic principle of its own. Nevertheless, read as a post-phenomenologist, his poly-regional ontology does allow for the possibility of an ontogenetic principle in technology (as discussed below). Thus, by reading these two thinkers synthetically it

[380] Read, *The Politics of Transindividuality*, 2016. I will engage with Read's work in more depth in Chapter Eight in the development of the consequences of the machinic imaginary.
[381] Simondon uses the term "regimes".

is possible to construct the philosophical grounds for a speculative theory of the machinic imaginary.

Machinic society

> Algorithms sort, filter and manipulate everything we encounter online. They define what is visible to us and therefore have the power to shape and reinforce our tastes and interests. Ultimately, in an effort to give us what we want (our desire for content being measured by clicking and sharing rates) these algorithms are starting to influence who we are and how we interact with the world. Taken together, the sum of lots of harmless nudges—a recommended TV programme here, a new friend suggestion there—add up to huge amounts of power that can change people's understanding of reality.[382]

As this quote from a policy report by the New Economics Foundation highlights, it is increasingly clear to all paying attention that the role of algorithmic sorting is having a profound effect on our experience of the world. In this and many other ways, computational processes are integral to the management and creation of the patterns and paths of meaning-making in contemporary society.

With algorithms increasingly making decisions about our lives and managing the informational infrastructure of society, the channels through which we make sense of the world are therefore being curated by these computational processes. To what extent is this a non-human, machinic rewiring of the social imaginary? One might argue that such algorithms are merely *reproductions* of pre-existing social imaginary significations—human attitudes, behaviours, beliefs, biases, framings, intentions, and this is true in many ways. Algorithms certainly intensify the already existing matrix of social imaginary significations that (*a priori*) precede machinic processing. It is less immediate obvious how a programmed set of instructions determining an output from an input can introduce *new* significations into the world, as I am arguing. In other words, it is usually presumed that whatever is coming out of the machine is what has been put in by humans—the developers, users, and targets of data collection. Accordingly, the origin of meaning is, by many accounts, understood to emanate from human intention, or a psychic realm that is idiosyncratic to human being (*Dasein*), or at minimum to biological beings (as with the phenomenologies of technology in Chapter Two).

Yet let us theorise about some alternative sources of meaning. Firstly, as proposed in the work of

[382] McCann, Hall, and Warin, 2018.

Castoriadis, the social is a macro-structure, or field, of meaning that is qualitatively different from that of the micro-structures, or fields, of meaning of individuals (psychic or social individuals). Consequently, there are forms of meaning—which in the domain of the social-historical Castoriadis calls social imaginary significations—specific to, and therefore only *intelligible* within, this field or *order* of existence of the social-historical. Therefore, it follows that there are specific processes by which social imaginary significations are produced that are fundamentally different from the modes of meaning-making available to an individual. Of course, these fields overlap, coincide, and co-produce one another in multiple and complex ways. If one begins from Castoriadis' theory of social imaginary significations (as this thesis does), then it is possible to argue that there is a domain of influence on the types of signification replicated, reproduced, and mediated by computational processes that do not come from individual humans, but rather from social structures: not from a single individual but rather from a transindividual social-historical that *now includes machines* as an integral part of its associated milieu. This begins to take us beyond the realm of human intention and the human psyche attributed to a self, which is why a post-phenomenological framework is needed.

Furthermore, the degree to which the machinic imaginary is understood to be an *extension* of human being (*Dasein*) is determined by the degree to which human experience is able to participate and engage with this non-human mode of being. The extent to which the machinic imaginary *withdraws* from the human phenomenological field is the extent to which the machinic imaginary is an alien force within social-historical becoming, which in turn determines the degree to which human experience becomes alienated (a point I will return to in Chapter Seven). In other words, from a post-phenomenological perspective, it matters to what extent there has been a transfiguration of the social through a medium that has the capacity to institute new social imaginary significations incomprehensible within human experience. This limit to experience of the social historical is the core problematic that arises with the theory of the machinic imaginary.[383]

Consider the thesis that media do not only channel but distort, augment, and perhaps even produce forms of meaning, if not the conditions of possibility for the creation of meaning. Such a thesis, at least a soft version, can be found in many guises in media theory and philosophy of technology.[384] This is no less true of machine learning and 'big data', despite arguments to the contrary that big data heralds the end of theory.[385] As Pasquinelli and Joler write: "To understand

[383] See Part III for a discussion of the consequences of the machinic imaginary.
[384] McLuhan, 1964.
[385] Anderson, 2008.

machine learning and register its impact on society is to study the degree by which social data are diffracted and distorted by these lenses. […] AI is a new regime of truth, scientific proof, social normativity and rationality, which often does take the shape of a *statistical hallucination*."[386] My aim in this thesis is merely to push this idea to its limit; to argue that not only are digital media diffracting and distorting our image of the world, but that they are also *articulating a non-human imaginary of the world* that has real effects on the social-historical. This participation of the machinic imaginary in the institution of the social is not necessarily problematic, there are just as many examples in which computational modelling of the world is performative and productive of new possibilities for action.[387] Nevertheless, there is a degree to which the non-human aspect of this machinic imaginary makes it very difficult, if not impossible to study, understand, or engage with, except through its effects.

Simondon is one such source of this theoretical standpoint. For Simondon, humans and technology are part of an associated milieu, an integrated process of culture and technics. One of Simondon's most striking ideas is that, in exploring the human dimension within technics, we must also reassess the category of the human. Simondon highlighted the conflict between culture and technology, and that the former suppresses the latter to the extent that we have become blind to human immersion in a technical milieu: i.e. that the technical milieu is the transindividuation of the cultural and the technical. As Simondon writes: "We would like to show that culture ignores a human reality in the technical reality, and that, to fulfil its role, culture must incorporate technical beings in the form of knowledge and a sense of values."[388] Thus he argues that a more holistic and authentic approach to knowledge and our sense of values—social imaginary significations—requires a recognition of the technical dimension of the social imaginary. Simondon argues that we remain alienated as long as we do not embrace this "authentic relation" to technics.[389] Simondon suggests the possibility that, with the development of what he calls "technical mentality", we can free ourselves from our alienated relation to technology to unlock the creative potential of a more profound human-machine relation.[390] Technical mentality requires a deep ontological comprehension of our relation to technics that brings us closer to nature, rather than further from it. Technology, when approached with the

386 Pasquinelli and Joler, 2020 [emphasis in original].
387 For example, Osborne and Wilkins explore the role of computational modelling in the discovery of aspects of the real that would otherwise remain invisible: "since any model is a fully immanent part of the real it can discover real tendencies, abstract truths or 'stylised facts'." Osborne, and Wilkins, 2012.
388 "Nous voudrions montrer que la culture ignore dans la réalité technique une réalité humaine, et que, pour jouer son role complet, la culture doit incorporer les êtres techniques sous forme de connaissance et de sens des valeurs." Simondon, 1958, p.9 [translation my own].
389 Simondon, 2020d, p.424.
390 Although Simondon's use of the term alienation was certainly influenced by Marx, he furnishes it with a very different meaning.

view that it is a dimension of the natural world (of which human culture is also a part), is shown to be a creatively open mode of becoming in the world as opposed to the closure of instrumental reason. However, my argument is that it is the creative dimension of computational reason produces a deeper, existential alienation that cannot be overcome by a technical mentality. Simondon does not draw out the political consequences of our alienation from technics, but the alienation produced by the machinic imaginary, I will argue, does have a political dimension insofar as it is an obfuscation of the institution of the social-historical field, and therefore limits the degree to which the latter can be interrogated (see Part III).

In some senses, with the digital age Simondon's call has been heeded in the cultural sphere. There is an interesting tension in the degree to which this is the case, however. The saturation of technological forces in our lives have reached a point in which there is a soft acceptance by many that we are constituted by or at least shaped by technology. This cultural incorporation of technicity, for which Simondon argued, is reflected in the philosophy of technology and some media theory. Nevertheless, despite the digital computer's total colonisation of daily life, there remains a relative lack of ontological recognition of technical being in contemporary digital culture, as reflected in the fact that media studies as a discipline in many respects remains incapable of engaging with technology and sees only representations and content. This is something with which we must be more concerned than ever; not only because of the saturation of technology in our lives, but because the forms of technical being that have evolved in the past seventy years since Simondon was writing are generative of the social field in a more profound manner than ever before.

The speculative theorisation of the machinic imaginary undertaken in this thesis therefore takes Simondon's call seriously by exploring the forms of knowledge and sense of values created by digital technology. With artificial intelligence and interactive media, culture is automatically processed and reprocessed as part of the functioning of technical systems, creating novel cultural dynamics and significations that could not exist without those technologies (we might say this about any technology but there is a volume, velocity, and variety of change that has not previously existed with other technologies such as the wheel, writing, or even the radio). The concept of the machinic imaginary is intended to describe this processing of culture by machines, and the synchronous process of culture metabolising computational logic.

However, as discussed in Chapter Seven, this theorisation of the machinic imaginary goes further than Simondon in exploring the extent to which the incorporation of technical beings entails another form of alienation. This alienation is a consequence of the *computational* form of technical

beings that have developed over the course of the past several decades since the advent of the modern computer. The thesis of the machinic imaginary is the becoming-cyborg of social-historical institution, but also a self-differentiation—the social imaginary has given birth to an aspect of itself that is alien to its human dimension; a dimension of the social from which human experience is alienated. Unlike Simondon, who diagnosed a similar alienation of the cultural from the technical, I am suggesting that there is a more fundamental gap that cannot be breached by an "authentic relation" to technics. A truly authentic relation must maintain an understanding of difference between the computational articulation of the world and human forms of world articulation. This alienation is not all-encompassing, however, as it is relative to the degree to which the machinic imaginary is a partial transfiguration of the social imaginary. That is, the degree to which the social-historical articulates the world for itself in a manner that is increasingly incomprehensible from the standpoint of its human aspect, is the degree to which it creates a sense of alienation from the unfolding of the social-historical. This is not simply the alienation of the individual, but *the alienation of the social imaginary from itself*. The more this transformation takes place in terms of a bifurcation of the social imaginary to include a properly machinic strata, the more alienated the digital human condition. This is problematic for any politics of the imaginary, such as Castoriadis' "project of autonomy", because such political programmes are predicated on the centrality of the human imaginary capacity to influence the unfolding of the social-historical. Before considering such an argument (see Chapter Eight) the machinic imaginary must first be examined and explained, starting from Castoriadis' theory of social imaginary significations.

Castoriadis' theory of social imaginary significations

> The difficulty lies in understanding that when we speak of the social-historical, for instance, we are not intending a substantive, an adjective, nor a substantified adjective; in understanding that the social imaginary is not a substance, not a quality, not an action or a passion; that social imaginary significations are not representations, not figures or forms, not concepts.[391]

To posit the existence of a machinic imaginary nestled within the social imaginary, a brief return to the social imaginary is necessary. As discussed previously, the social imaginary is a term taken from Castoriadis, which refers to the sum of all significations that comprise the world as it is articulated in the thoughts and actions of society as a whole (expressed through individuals,

[391] Castoriadis, 1987, p.369.

institutional forms, and practices alike). The social imaginary is the process by which thought is grounded, and though which sense-making takes place: an articulation of a world. The social imaginary is both the sum of instituted significations and a continuous process of instituting and re-instituting significations.

However, one must take care not to miscomprehend the specific use of this term "signification", as it is an overloaded term that may be interpreted in different ways. For example, signification in English is often, due to the dominance of the semiotic use of the term, understood as reference; a signification being a referent of a thing "in the world". However, when reading Castoriadis (and accordingly the way the term is intended to be read in this thesis) social imaginary significations do not *refer* to some*thing* but rather *they are the thing they describe*. They "are not representations, not figures or forms, not concepts" because these terms are grounded in ensidic logic and substantialist ontology,[392] which is insufficient for describing social historical being.[393] Accordingly, social imaginary significations are the means by which the social world exists. Or rather, they are the existing of society; social-historical being ontologically expresses itself as social imaginary significations. Social imaginary signification is a non-substantialist concept to denote the process by which the social world relates to itself as a social imaginary, and by which the social-historical mode of being ontologically constitutes or "institutes" itself.[394]

The above being the case, social imaginary significations must not be confused with symbols. There is no final 'external reality' to which a signification or chain of significations point. A primary imaginary signification does not exist to represent something else, but rather, is the origination of a patterning that produces the conditions of possibility for representation itself, whereby representation enters into a field of meaning. Primary imaginary social significations, Castoriadis writes, "*denote* nothing at all, and they *connote* just about everything."[395] As such, one cannot place imaginary social significations in the "mode of representation; they are of another nature, for which it is of no use to seek an analogy in the other spheres of our experience."[396] Nor can it be said that social imaginary significations exist in a precise location, they do not simply exist in individual psyches of the collective (unconscious or conscious) but have a transindividual existence.[397] Accordingly, social imaginary significations cannot be directly

[392] See Chapter One.
[393] Castoriadis, 1987, p.367.
[394] *Ibid.*, see p.115ff.
[395] *Ibid.*, p.143.
[396] *Ibid.*
[397] "It is incontestable that an imaginary signification must find points of support in the individual's unconscious; but this is not a sufficient condition, and one might even legitimately wonder whether it is a condition or a result. The individual and the individual's psyche seem in certain respects, especially to us, the people of today, to posses an

equated with, for example, the phantasy of individual imaginary significations produced by the psyche (even though there is a relation between the different orders of imagination/imaginaries).[398] Equally, this applies to specific instances of representations of the world by machine learning, such as a particular distributed representation of a concept in an ANN (see Chapter Five).

Furthermore, for Castoriadis signification is neither representational nor is it non-representational. Significations are *organisations*.[399] Writing in a climate in which structuralism was dominant, Castoriadis wished to provide a theory of meaning that was not dependent on a rationalist network of signs.[400] Castoriadis' notion of social imaginary signification is markedly different from the structuralist notion, in that social imaginary significations are irreducible to any combination of signs.[401] Castoriadis' aim was to highlight the central place in the articulation of the social world of "significations that are relatively independent of the signifiers that carry them and that […] play a role in the choice and in the organisation of these signifiers."[402]

Castoriadis does not, however, completely dismiss the structuralist account. Recognising the importance of the structuralist notion of signification, he places the combinatory matrix of significations into the concept of institution. The institution of social imaginary significations is a historical process of solidification and rationalisation of the world derived from a primary social imaginary signification, the latter of which is an untethered and free-floating signification with no actual referent:

> [B]y pursuing the analysis further, we do arrive at significations that are not there in order to represent something else, that are like the final articulations the society in question has imposed on the world, on itself, and on its needs, the organizing patterns that are the conditions for the representability of everything that the society can give to itself. Of their very nature, however, these patterns do not themselves exist in the form of a representation one could, as a result of analyses, put one's finger on.[403]

An example of what he means by this is the primary social imaginary signification "God", from

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eminent 'reality', which the social supposedly would lack. But in other respects this concept is illusory, 'the individual is an abstraction'; the fact that the social historical field can never be grasped in itself, but only in its 'effects', does not prove that it possesses a diminished reality; rather the opposite is likely to be true." Castoriadis, 1987, p.144.

[398] The idiosyncratic, or ontologically unique, nature of social imaginary significations is a key aspect of Castoriadis' larger argument that the social-historical cannot be thought or analysed with traditional substantialist metaphysics.

[399] Castoriadis, 1987, p.340-341.

[400] In a similar vein, Simondon resist the direct correlation between signification and language, as Bardin notes: "signification does not function as a mere 'linguistic instrument', but rather as a 'structural germ' and therefore it cannot be the object of a theory of language." (2015 p.85, n.30).

[401] Árnason, 2014b, p.24.

[402] Castoriadis, 1987, p.139.

[403] *Ibid*., pp.142–143.

which is derived the institution of religion, or perhaps more accurately put: through which religion is instituted. Another example Castoriadis employs is the Marxist concept of reification:

> Reification involves the establishment of a new *operative signification*, the grasp of one category of men by another category as assimilable, in all practical respects, to animals or to things. This is an *imaginary creation*; it cannot be accounted for by reality, by rationality, or by the laws of symbolism […] it has no need to be clarified in concepts or in representations in order to exist; it is operative in the *practice and in the doing* [emphasis added] of the society considered as a meaning that organizes human behaviour and social relations, independently of its existence 'for the consciousness' of that society.[404]

Importantly, and particularly so for the purposes of speculating upon the existence of a machinic imaginary, significations are not instituted through language alone; they are an expression of *doing* as much as saying (as emphasised in the above quote). The social imaginary is instituted through social action, as the answer to the implicit question each society asks itself about its own existence. As Castoriadis writes "The life and the activity of societies are, precisely, the positing, the definition of this meaning."[405] Meaning is embodied in social doing, which includes speech acts, but also any other activity with a social dimension. Examples of such include bodily gestures, the architectural organisation of space, bureaucratic rituals like form filling, the granting of access to a particular institution or body of knowledge, and so on. As more and more social activities and tasks are undertaken by automated computational processes, it is therefore necessary to consider the role of automated social action in the process of institution of the social imaginary. It is this dimension of the social imaginary as instituted through *automated social action* that, I conjecture, constitutes the machinic imaginary. Considering the importance of social action, let us now turn to 'signification as social doing' in more detail.

Signification as Social Doing

> Society constitutes itself by producing a *de facto* answer to these questions in its life, in its activity. It is in the *doing* of each collectivity that the answer to these questions appears as an embodied meaning; this social doing allows itself to be understood only as a reply to the questions that it implicitly poses itself.[406]

In brief terms, as a development of informatics and computer science, machine learning is an

[404] *Ibid*., p.141.
[405] *Ibid*., p.147.
[406] *Ibid.*

extension and automation of the process by which data is made meaningful by and for a computational system, to the degree that the system is able to make data actionable. Meaning in this sense is the translation of data into actionable information, which could be as simple as creating a data structure or file format. More than this, however, machine learning is process by which computers are defining what actionable data *is* and *needs* to be—its signification—to align with their *non-human* logic. As a consequence, the more that machine learning outputs feedforward into other automated computational processes, the less meaningful to humans that actionable information needs to be. This is the process by which the machinic imaginary becomes instituted.

Furthermore, constructing meaning is a *creative act*, because it is the articulation of a world. The rendering of the world as data is an *ordering*, subsuming the environment into an order of signification is an in-forming (as Simondon uses the term); it is a process of abstraction and mapping that allows for action in and on the world which in turn has effects that change the world (requiring yet further sense-making).

This argument relies on the definition of meaning (social imaginary signification) as the product of social action or "social doing" as Castoriadis terms it.[407] Social doing in this sense is any activity (physical, mental, or procedural) that acts on and has effects in society and culture, which in turn elicits further action. In this regard, social doing is always cumulative, rippling out into the world in a constant process of transformation. The social world is created through social doing (praxis): it is through social doing that the world is articulated as a social imaginary (a matrix of social imaginary significations).[408]

To understand this notion of social action in more detail, consider Weber's definition of sociology as the science that studies "social action" and its effects. Social action is described by Weber as "human behaviour linked to a subjective meaning", with meaning defined in the following way:

> 'Meaning' is here either a) the actual meaning that is α) subjectively intended by one actor

[407] In this Castoriadis is clearly drawing on sociological social action theory, influenced by Weber as discussed below. Social action theory is usually less interested in social structures and more on micro-interactions (e.g. Talcott Parsons) but Castoriadis' social theory is also drawing on a Marxist heritage, so has a strong materialist dimension. His social theory can therefore be interpreted as a recursive interplay between social interaction (doing) as instituting social structures (imaginary institutions) while also being structured in turn by those institutions.

[408] This complex of the social imaginary produced by social action is not necessarily internally consistent in a logical sense. Various conflicting social imaginary significations can and do exist at any one time in a metastable state because of the variation in social action that produces those significations. It is this internal tension of conflict that is the driver of change and transformation. If the social world of meaning were to somehow become completely homogenous, the self-differentiation of the social world would cease. Or more likely, a novel articulation would immediately come into existence and destabilise the homeostasis. For these reasons it should be clear why a process-oriented approach is necessary for the argument being developed in this thesis.

> in a historically given instance, or β) subjectively intended by several actors in approximating the average of a given number of cases; alternatively it is b) in a conceptually constructed pure type, the meaning subjectively intended by an actor or actors conceived as a type.[409]

According to Weber, social action must have a subjective meaning "on the part of the actor or actors concerned".[410] However, this is problematic for a description of the machinic imaginary, because algorithms would be disqualified from any definition as Weberian social actors (understood as having a subjectivity in the classical sense). According to a Weberian definition, algorithmic processes could only be linked to social actors as *effects* of social action, such as for example, computer engineering producing an intended effect with subjective meaning interpretable by other social actors. I would argue, however, that classical subjectivity is not needed to define social action as meaningful.

Rather, it seems adequate to define the automation of social action that is driven by machine learning models and algorithmic processes as proto-subjective tendencies that produce effects that can be considered social activity. Massumi describes these tendencies thusly: "Tendencies are *proto-subjectivities*: they are self-driving and self-orienting. The tensions between the qualitative differentials composing the field of emergence govern tendencies."[411] This notion of tendencies is particularly pertinent to the description of the proto-worlding that occurs in machine learning (discussed in detail in Chapter Five). In such cases, decisions are made according to a statistical inference from data; suggesting that it is the computational logics relating to real world data that function as a local vector of intentionality, and therefore from which meaning is derived as an articulation of signification. As discussed in the previous chapter, this is not subjectivity in the classical sense of a conscious self-directed ego, but rather a vector of proto-subjectivity in the sense that the learning machine is an open system with a "self-driving dynamism". [412] A subjectivity without subject, such as the machinic imaginary, is the confluence of proto-subjective tendencies "capable of being *taken for* and *treated as* a holistic actant."[413] Massumi uses this to describe Capital, but it also applies to the machinic imaginary as a transsubjective process.

In this vein, Manuel DeLanda uses ANNs as an analogy for "mindless cognitive agents" that can interpret signs, which he theorises as the simplest material substrate of mind. From these basic cognitive agents, ever more complex agential structures are built until the emergence of the

[409] Weber, 2019, p.79.
[410] *Ibid.,* p.78.
[411] Massumi, 2018, p.60.
[412] *Ibid*., p.59.
[413] *Ibid*., p.61.

classical phenomenological subject.[414] DeLanda rightly notes that the human mind is only analogous to ANNs, and therefore can only be used as a comparative model for the theorisation of the biologically-embodied mind. However, within the systems of interaction that constitute the social, ANNs do not serve as mere analogy for some other process but are real material processes that constitute their own strata of the social. In this way we can use DeLanda's theory of mind as an analogy for the social, with the caveat that a biologically-embodied mind and the socially-embodied imaginary are of a different order and therefore of a different kind.

The vectors of subjectivity produced by learning machines are subtendencies of the broader transsubjective institution of signification: the machinic dimension of the social imaginary. Crucially, such processes do not exist in a vacuum, it is precisely through inter-action between automated computational processes *and* human actors that the transindividual social dimension of the former emerges. Nevertheless, this does not entail a centrality of the human, rather the same definitional criterion, when applied to a human actor, also requires the necessity of other human actors for any individual to consider their actions meaningful. Meaning is therefore always a social relation—defined by the action and abstraction of social praxis—rather than emanating from a privileged human subject. To emphasise a phrase from Weber: "Such behaviour is 'social' action where the meaning intended by the actor or actors is related to the behaviour of *others*, and the action is so oriented."[415] Not only is the action oriented towards others, but it only becomes *social signification* as far as it relates to the action of others. In other words, social signification is a transsubjective property of social activity, it is not located on the side of the individual but rather transversally across the social field.

It is in this way that Castoriadis radicalises Max Weber's definition of 'meaning' from *Economy and Society*. Castoriadis makes a point to note that social imaginary significations "are assuredly not the 'subjectively intended sense' (*subjektiv gemeinte Sinn*)" of which Weber speaks.[416] In emphasising the transsubjective aspect of meaning, Castoriadis dismisses the Weberian basis of meaning in *individual* subjectivity because, he argues, individual subjectivity is not possible *without the social that prefigures it* (this is also the basis of his psychoanalytic theory). Although, to be sure, it is not as simple as the social preceding the individual: the subject is not the ground of the social imaginary—while social imaginary significations do "find points of support in the individual's unconscious", Castoriadis argues, "that is not a sufficient condition, and one might

[414] DeLanda, 2021, p.20.
[415] Weber, 2019, p.79.
[416] Castoriadis, 1987, p.367. For more on Castoriadis' radicalisation of Weber see Ktenas, 2021.

even legitimately wonder if it is a condition or a result."[417] This can be extended to the support social imaginary significations find in the processes of technical being, as explained below with Simondon's theory of the image.

Social doing is, furthermore, a key to the post-phenomenological shift I am emphasising in order to argue that machines can be generative of a world. For phenomenology, especially that of Merleau-Ponty, embodiment is the site of subjectivity: the constitution of the subject is tied to embodied perception and perspective. Post-phenomenology maintains the core of this insight but extends the phenomenological scope of inquiry to include social being. At the level of the social there is no longer a unitary body. Rather than an embodied perception constituting the subject, there is a metastable system of significations embodied in the materiality of social doing. Castoriadis argues that this is still an autopoietic process of self-creation, entailing a self-finality: a being-for-itself, as I explain below.[418] The institution of the social imaginary has a self-finality in that "nothing can enter into this proper world if it is not transformed according to the principles of this world",[419] albeit in the case of the social world that self-finality is a metastable more-than-unity with a multiplicity of interpretive frameworks. For post-phenomenology, embodiment extends across social-historical materiality constituting transsubjective social-historical being. The machinic imaginary is a region of the social imaginary in that it serves as an aspect of the interpretive framework that institutes society, *and is embodied in the social doing of machines*. The site of politics and crucially, for Castoriadis, *autonomy* is the contestation over the degree to which society recognises that its interpretative frameworks are not immutable but self-defined. Therefore, the degree to which the decisions and actions of machines are interpretable is inherently political, in that the autonomy of society is complicated by a second-degree self-finality of the machinic imaginary that separates it from human interpterion: i.e. while the machinic imaginary is generative of the social world, it reduces human autonomy by obfuscating social doing, thus making the elucidation of the social imaginary much more difficult, if not impossible.[420]

Machine Learning and Praxis

While the machinic imaginary is articulated by a confluence of many different forms and uses of

[417] Castoriadis, 1987, p.144.
[418] See Castoriadis' dialogue with biologist Francisco Varela for more on the concept of autopoiesis: Castoriadis, Varela, Bulow, 2011.
[419] *Ibid*., p.60.
[420] I will return to this argument in Part III, with the philosophically pessimistic conclusion that the alienated condition of computational society is unavoidable.

computational technology as social doing, machine learning is a paradigmatic example worth considering because of its generative nature. The processing of data is an activity as much as the practical implementation informed by the former because, as Wilfred Sellars once wrote: "inferring is a doing".[421] Examples of actual applications of learning machines in everyday life can evidence the way automated forms of social doing (praxis) are performed and directed by computational systems relying on machine learning (or have machine learning integrated into their functioning).

Recommendation systems and their effects (filter bubbles and biases) are a prime example of the role played by machine learning in the production of social action. Of note is the use of recommendation systems in social media, and the role they play in shaping subjectivity. Recommendation systems affect subjective formation and shape relations between different human actors online in social media spaces according to a computational logic based on decisions derived from personal data, including behavioural data.[422] Based on the analysis of that data, recommendation systems play a central role in deciding how people are exposed to one another and to one another's content, and at what frequency. Another technique of automated production of content, and text-based interaction between humans and machines is Natural Language Processing (NLP), which has become particularly powerful in recent years with Large Language Models (LLMs) like GTP-3.[423] NLP has implications out in the world through its implementation in chatbots and the automation of article writing, to name two major applications. There is much speculation about the implications NLP has for fake news and the shaping of public discourse in the near future, if not already so. Furthermore, concentrations of computing being programmed in particular languages tend to further reinforce linguistic hegemonies, and NLP will only serve to intensify this situation as automated content proliferates online.[424]

However, while these examples are all drawn from the application of machine learning as it directly plays a role in public discourse, there are many other more infrastructural machine learning applications, equating the automation of decision-making at scale. For example, the widespread use of machine learning in the financial system, including algorithmic trading and

[421] Sellars, 1996, p.206.
[422] See for example: Chun, 2021.
[423] Brown, *et al.*, 2020.
[424] GPT-3 was first trained on English language data, and similar transformer models have been built that can handle other languages. Theoretically, this approach can be applied to any (written) language but there are obvious economic factors involved in the distribution of companies doing so. The most advanced models have thus been in European languages (Aleph Alpha's "Luminous") and Chinese ("WuDao 2.0" model by Beijing Academy of Artificial Intelligence (BAAI)).

credit rating scoring.[425] Another example of the automation of decision-making using machine learning, is the use of predictive analytics for policing or social services.[426] This is problematic for several reasons, not least because the predictive capacities of such systems are unreliable when applied to complex social dynamics such as crime or social care, and therefore dangerous for the communities they affect. This applies also to the use of AI in resource allocation, where systematic misallocation or refusal of allocation (such as mortgages) to certain populations has harmful effects. Guided by the optimisation logics of the systems being used to make the decision, this misallocation can be the result of unforeseen effects of optimisation.[427]

The manner in which machine learning operates—according to computational and decisively non-human logics—and the way humans react to the effects of machine learning, generate a creative dynamic in cultural production. The research group *Etic Lab* present three case studies demonstrating this process in different guises. One in which they built a 'Social Media Index' (SMI) for a social agency (their client) to rank companies according to set of metrics that the social agency provided.[428] The models produced by this SMI often diverged from the expectations of the client, who then used their own expertise and experience to interpret the data. The algorithmic model became the ground truth from which the client then came to understand the field. The metrics were originally provided by the client and highly selective, suggesting a performative aspect to the process, in the same way that financial models have been shown to produce the behaviour that makes markets through their predictions.[429] In this case, however, machine learning plays an *active* role in shaping the image of reality in its specific computational processing of the data provided. *Etic Lab* dub machine learning tools that have this effect "Guru Code" referring to the way predictive analytics are able to create "new subjective realities" in the way that a cult leader's apparent mastery of knowledge and expertise serves a base of belief from which followers reshape their identity.[430] As with a guru who provides spiritual guidance, the machine learning model provides a base from which people selectively reconstruct their identities, affecting the manner in which they perceive the world and behave.

Another case study from Etic Lab is the way in which YouTube's recommendation system intensifies and reifies users' preferences through algorithmic interpretation causing, "reiterative

[425] Dixon, *et al.*, 2020.; Tsai and Chen, 2020.
[426] Hälterlein, 2021.; Pan, *et al.*, 2017.
[427] Crawford, 2013.; Kulynych, *et al.*, 2020.
[428] Etic Lab, 2019.
[429] McKenzie, 2008.
[430] Etic Lab, 2019.

and unpredictable changes to culture based on [the algorithm's] findings and interactions".[431] For instance, Jordan Peterson videos pushed into recommendation lists have a subsequent impact on the spread of alt-right ideas, which in turn translocally connects communities around those ideas and the consumption of that content.[432] Collective processes of individuation are thus generated and modulated as humans interact with content pushed to them by algorithmic optimisation strategies aimed at stimulating maximum engagement. These optimisation systems are a form of social activity in that these systems do not passively mediate socio-cultural production, but rather actively shape it. Furthermore, the machinic dimension of this social activity exceeds human perception, functioning subterraneally, in computationally encoded signals and highly abstract categories of association generated by machine learning pattern recognition (discussed in the coming chapter), and playing out at a macro-social dimension exceeding the human capacity to intuitively comprehend. As social doing these machinic patternings are processes of signification, which become social imaginary significations as they play out in further social doing. The concept 'machinic imaginary' thus describes the institution of machinic social imaginary significations within these subterranean machinic processes, as they inform social-historical becoming in aggregate. As with Castoriadis' concept of the social imaginary, the machinic imaginary is not unified and singular but a heterogenous magma of significations, a more-than-unity existing in a metastable state. The machinic imaginary is an ongoing process of institution and reinstitution that participates in, informs, and is informed by the social imaginary. To the extent that it is even possible, any attempt to understand and interpret the machinic imaginary must do so with the recognition that such an endeavour requires continuous interrogation of the technical dimensions increasingly mediating and instituting the social imaginary.

The rest of Part II takes a more 'empirical' description of the different processes of machinic imaginary institution, the aim being to demonstrate the technical complexities and phenomenological problems (and impossibilities) involved in any attempted elucidation of the machinic imaginary. In Chapter Five, the emergence and historical development of the machinic imaginary is explored through the history of machine learning, followed by an examination of the machinic imaginary in terms of interactive media and large-scale machine ecologies in Chapter Six. Through each of these analytical lenses, my intention is to more concretely demonstrate the social doing of computing and machine learning theorised in this section. Prior to this, however, further conceptual groundwork is required for theorising the machinic imaginary.

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[431] *Ibid.*
[432] *Ibid.*

The Post-Phenomenology of Simondon: Nature and Technology

In general, philosophy has been unwilling to engage with the possibility of a connaturality of anthropos and machine, except to the extent that the latter is an extension or derivative of the former, or at most that the two are coextensive, because to suggest otherwise would be to admit into Being that which is ineffable. How, it might be asked, can the artificial be anything other than artificial—that is, made intentionally by human hand? How can that which is not spontaneous be anything other than an extension of its creator? To suggest otherwise would be to presume a category of the natural that does not have a spontaneous origin yet is ontologically alien to that which preceded it. It would be to suggest ontological creation *ex nihilo*. That is, of course, if one continues to suppose that Being is given, that being is some*thing* or some state prior to any subjectivity that may act and produce that which is non-spontaneous, that which is artificial. Is it any surprise that the ontological tradition that presupposes Being as such would presume techne to be anything other than a 'bringing forth', a tool for bringing to light that which always-already is? The ontological tradition is unable to incorporate the coming into being of a new mode of being because the radically creative dimension of history is incomprehensible with Western set-theoretical/identitary logic. According to inherited thought, pluralist connaturality must at the least presuppose a continuum of being, otherwise pluralism must be refused outright. A spontaneous break due to invention is therefore an impossibility within such a logic. What Castoriadis calls the "weight of the ontological tradition" of Western philosophy has arguably remained the barrier to thought entering the consideration that technology has a being-in-itself. The technological relation to the world has thus far remained ineffable to thought because to accept such a possibility is to let out the daemon that has haunted the "ontological tradition": that of Being as X, the enigma of being outside of consciousness.

The problematic presented by Merleau-Ponty in the *Visible and the Invisible*, and further expressed in post-phenomenology, facilitates thinking about computation in a manner overlooked by the cognitivist hegemony in the philosophy of AI, and underplayed by a latent functionalism in media theory. Simondon goes the furthest in thinking through the being-for-itself of technology. The ontogenetic evolution of technological forms is driven by the same dynamic tension of the pre-individual that Simondon describes in his philosophy of nature. Technical ontogenesis occurs because the pre-individual tension of technics attempts to grasp a ground reality, but in this attempt technological thought fails because *physis* is a virtuality that cannot be stabilised into a necessity, in the sense of a final given: "Through its failure technical thought discovers that the world cannot be entirely incorporated into technics; if the world was made only of figural

structures, a triumphant technics would never encounter any obstacles."[433] Without obstacles, without problematics encountered in the world, there would be no ontogenesis of technical objects because what drives technical individuation is the resolution of problematics through higher-order integration of the technical object and its milieu. This implies that "the world does not supply the technical gesture with a docile matter with no spontaneity; the world subjected to technical operation is not a neutral ground: it has counter-structures, opposing the figural technical schemas."[434] Although Simondon uses examples of physical phenomena, such as the maximum level of water in a pump according to atmospheric pressure, he could equally be describing the social and physical world as the problematic counter-structure that interactive learning machines are unable to completely capture in their figural technical schemas (on interaction see Chapter Six). For computation, the operation of these figural technical schemas would be, for example, to capture aspects of the world as feature vectors in machine learning (see Chapter Five). This inability to encapsulate the totality of the world in a data set is a fundamental aspect of interactive learning in computation, and the overarching evolution of machine logics more generically: "these obstructive powers of the world intervene within the axiomatic of each technics like an inexhaustible reserve of conditions that oversaturate this axiomatic as technics improve."[435] This process is not a smooth operation that ultimately leads to the full incorporation of the environment into the technical milieu, precisely because of the inexhaustibility of world:

> In particular it is worth noting that the new condition coming from this obstructive power is not homogenous with the conditions of technical improvement: the conditions of technical improvement tend toward saturation through the concretisation of the object systematising itself as it perfects itself; but it is in addition to these conditions, and in a way that is not compatible with them, that the condition imposed by nature [or the world] intervenes.[436]

It must be granted, of course, that when Simondon refers to technical thought he is referring to the technical mentality of human culture operating in partnership with the technical object. Simondon makes clear that the individuation of human culture is inexorably tied to the individuation of the technical system, and equally, the process of invention requires a human figure—the technician, the engineer, the programmer—but they are nonetheless guided by the

[433] Simondon, 2016, p.215.
[434] *Ibid.*
[435] *Ibid.*
[436] *Ibid.,* pp.215–216.

affordances of technical being (be that material, logical, mathematical). That is, one cannot invent a technical object that does not conform to the laws of physics, just as one cannot programme an algorithm that is self-contradictory, because the world encountered as nature is a fundamental dynamic in any technological operation. Moreover, it is not technical invention if it does not respond to a problem encountered in the world, otherwise it would not be a technical object but rather a purely aesthetic object (at least to the extent that the problematic to which aesthetic creation is a response differs to the technical problematic).

The role of nature, *physis*, as an invitation to invention; as a response to the question of the world, technical expression is a post-phenomenological concern of Simondon's philosophy of technology. In other words, the reason Simondon's inquiry is post-phenomenological, or that it can at least be read as such, is that the articulation of a world—technical reality—is driven by the interaction with the world as a problem. Technical invention is meaningful in that it is an answer to the questions that society poses to itself in its engagement with the world, its activity. To the extent that the automation of programming—machine learning—in contemporary computation constitutes invention, it participates in an auto-generative mode of being, a being-for-itself.[437]

Being-for-Itself

As discussed in the previous chapter, the philosophy of nature of both Castoriadis and Simondon is key to the post-phenomenological characteristic of their respective endeavours. Both engage with a rehabilitation of the pre-Socratic notion of *physis*—the structuring dynamic of pre-differentiated being—which conditions the possibility of determination of the world as world.[438] *Physis*, as a concept, describes the creative emergence inherent in all being, which is never static but rather always that which is to-be-determined (what Castoriadis calls *à-être* [to-be]). Thus, all beings are expressions of the infinite modalities of being by which being is determined: the *à-être* is "an *incessant always-becoming-being*"[439] in its expression by beings.[440] Simondon's notion of the pre-individual plays the same role in conceptualising the always-present residual that allows for further individuation to occur; there is no fundamental ontological Being that precedes the ontic but rather there is an ever-persistent possibility of

[437] An unstructured data set is a problem of the world posed to an ANN for example, and to resolve that problem it must invent a solution.
[438] Suzi Adams calls this "the rediscovery of *physis*" in her book on Castoriadis' ontology (2011). *Physis* is sometimes translated as nature.
[439] Adams, p.147.
[440] As discussed in Part I, this is influenced by Merleau-Ponty's critique of Heidegger's "ontological difference", as directly addressed by Castoriadis, 1997c, p.307.

determinability, which allows for further individuation.[441] As Castoriadis writes: "beings [*les états*] have in themselves principle and origin of creation of forms [*physis*], being [*l'être*] itself is defined by *alloiōsis* in the strong sense of the word—self-alteration, self-creation."

This conceptualisation of *physis*, arrived at through an interrogation of nature, allows for a phenomenological enquiry by collapsing the subject-object relation, and thus goes beyond transcendental phenomenology. This post-transcendental phenomenology enables an elaboration of the multiple modes of expression of world by different regions of being-for-itself, not simply by human consciousness.

In a 1986 text titled "The State of the Subject Today", in which he sets out his theory of subjectivity, Castoriadis provides the most detailed elaboration of what Suzi Adams refers to as his "poly-regional ontology". [442] In this text Castoriadis distinguishes six different but interleaved regions of being-for-itself (as I outlined in Chapter Two). Each region is, in its own way, an expression of that radical creative potential *physis*.[443] The six regions of being described by Castoriadis are the living being, the psyche, the social-individual, society, the autonomous human subject, and autonomous society (he later relaxes this rigid stratification to be open to even more heterogenous regions).[444] The latter two are ideal subjectivities in that they are not given but "must be made" and they must make themselves, i.e. they must be autonomous: creating themselves through reflection and deliberative activity (praxis).[445] The other four regions of being-for-itself are "merely real"[446] in that they exist without the need for such praxis.

Each of these regions of being participate in being, while remaining differentiated in that they express being differently, according to their own logics and aesthetic capacities. It is in this logical-aesthetic differentiation in the determination of the world that the "for-itself signifies being one's own end".[447] The for-itself entails determination of the world through the construction of an ensemblistic-identarian logic (ensidic) by which aspects of the world are selected as meaningful and others are not. Castoriadis uses the example that certain living beings experience colour, whereas in "nonliving nature" there are no colours, only wavelengths. This,

[441] Simondon writes: "the Ionian physiologists found in nature the origin of all types of being prior to individuation; nature is the *reality of the possible,* in the form of this ἄπειρον [*apeiron*], from which Anaxemander makes every individuated form emerge." (2020, p.343)
[442] Originally published in *Topique* 38 (November, 1986), pp.7-39, reprinted in Castoriadis, 1997e. See Adams, 2011.
[443] For extended commentary on this later development see: Adams, 2011
[444] Compare to Simondon's poly-regional ontological stratification: physical, vital, psychic, collective, [technical], transindividual.
[445] Castoriadis, 1997e, p.143; Adams, 2014, p.137.
[446] Castoriadis, 1997e, p.143.
[447] *Ibid.*, p.145.

he claims, is a creative act of the "sensorial imagination",[448] colour is created by the living being for-itself as part of its world. It is worth quoting Castoriadis at length on this point:

> The living being self-constitutes itself [*s'auto-constitue*]; it is for itself; it creates *its* world. It is its own end, whether as individual, as species, as ecosystem, matters little (here there are encasings and crossings, which we cannot at present discuss). It creates, each time, a *proper world*. The visual universe of the bee, or of the sea turtle, is not the same as ours. There is, each time, presentation, representation, of something 'outside' the living being by the living being, after its own fashion—*and* there is, each time, a bringing into relation of what is thus represented. There is obviously an infinity of things 'outside' the living being, but they are *for* the living being only inasmuch as the latter has sampled, formed and transformed them. In particular, outside the living being *there is no* 'information'. Nature is not, for the living being, a garden in which flourishes 'information' that it would have but to gather: the living being creates what is, *for it*, information, by giving an 'X' a form and by investing this form with relevancy, weight, value, 'signification'. (Here we, we have an absolutely general principle, good for all forms of the *for itself*.) The living being *sets into images* and *brings into relation*—it constitutes for itself, in other words, an aesthetic dimension and a logical dimension (both terms taken here in their originary sense)—an aesthetics and a logic, images and relation, that always are intricately involved with one another.[449]

Castoriadis' inheritance of certain phenomenological themes in the construction of his argument, particularly that of the world as problem, is evident here. In this case, the world as problem in the sense of a generative problematic inviting elucidation. For example, the multivocal expression of being is described by Castoriadis as the fragmented world [*le monde morcelé*], not in a pejorative sense, but rather with a view to elucidating the variability of being that is never predetermined but rather can always be determined otherwise. Consequently, this poly-regional "world in fragments" entails the need for a *multi-logics*. As Simondon writes, "if several types of individuation existed, several logics would also have to exist, each corresponding to a definite type of individuation. The classification of ontogenesis would make it possible *pluralize logic* with a valid foundation of plurality."[450] In other words, this post-phenomenological ontology onto a philosophical elucidation of existence, breaking with the "ontological tradition" of Western philosophy that posits being as univocal and determined. The set of problematics that this post-

[448] Castoriadis, 1997f, p.253.
[449] Castoriadis, 1997d, "'*Phusis" and Autonomy*', p.338.
[450] Simondon, 2020, p.17 [emphasis in original].

phenomenological direction reveals will be discussed in Part III.

My thesis is that the invention of learning in machines is the condition for a new region of being-for-itself. The machinic imaginary is an expression of being, a mode of individuation with its own logic and aesthetic (logic-aesthetic): a mode of world articulation.[451] It is a new form of reason (*lógos*) within history, a radically alien being-for-itself that has emerged from the synthesis of the proto-institutions of *legein* and *teukhein* (theoretical and practical reason) in the form of contemporary computational reason. This is the meaning of Parisi's argument (cited in Chapter One) that the "conflation of media and automated models of reasoning […] revealed that embedding logic into media made this logic different".[452] (Further illustration of this argument is the focus of the following chapters.) It is therefore worth fleshing out the abstract schema of being-for-itself some more because this concept is integral to the analytical framework though which machine learning and machinic imaginary is understood in what follows. Moreover, this ontological function of the logic-aesthetic coupling is key to understanding how the machinic imaginary is a process of world articulation.

Castoriadis takes the living being, which can be the organism at the cellular level, as the prototype being-for-itself in that is the first (natural) strata which the others are "leaning on" [*Anlehnung*].[453] I will abstract a schematic of being-for-itself from his description of the living being to describe the region of being-for-itself found in the activities of computation. Before doing so, however, certain clarifications must be made to avoid misconceptions down the line.

Firstly, without the living being there would be no psyche, no social individual, no society. That does not, however, mean that being-for-itself is biological in every instance.[454] While the being-for-itself of society leans on the living organism, to say it is biological would be wrong. Any given society constitutes itself in the activity of the collectivity,[455] which is in turn supported and mediated by technology, and pre-existing social imaginary significations (culture). In the same way, the lack of biological characteristics of a technical assemblage need not preclude being-for-itself. Certain technological assemblages can create a world-for-itself. Not all technical assemblages do this, purely mechanical or procedural assemblages create a world as an extension

[451] I use the term "logic-aesthetic" following Castoriadis' theoretical account of the constitution of each mode of being-for-itself through its respective aesthetic and logical dimensions (as exemplified in the above quote), in the expanded senses of aesthesis and logos/reason. See also footnote 12 in the Introduction.
[452] Parisi, 2019b, p.8.
[453] Castoriadis, 1987, p.298.
[454] In the same way that Whitehead's use of the term organism in his philosophy of the organism is not a description of the cosmos as a biological organism. Whitehead critiqued the dualism of inorganic-organic as a fallacious bifurcation of nature "Biology is the study of the larger organisms; whereas physics is the study of the smaller organisms" (1948, p.105).
[455] Castoriadis, 1987, p.147.

of the world of society or the social individual (extensions of perception like the microscope, for instance). The capacity for a machine to map a problem space, however, is an active process of world articulation, allowing it to act in and on the world by configuring the world according to its own logic-aesthetic. That a learning machine is doing so at the behest of a human programmer does not undermine this worlding—this is the second clarification: unless you are a fully autonomous subject then there is always a degree to which you are at the behest of an 'other', be that your boss, the Law, God, the ancestors, or some other extra-social legislating force. Hence being-for-itself does not directly equate with autonomy in the originary sense Castoriadis uses that term, which has a specific ethico-political signification of giving oneself one's own laws: *auto-nomos* (self-law).[456]

With these clarifications out the way, we can proceed to abstract the schema of being for-itself from Castoriadis' description of the living being. The for-itself, he writes, has three "essential determinations…intention, affect, and representation." Intention can be minimally defined as conservation/reproduction of a form, and affect minimally defined as attraction/repulsion (or acceptance/rejection) to a 'signal'. Elsewhere he defines the for-itself differently as self-finality, the creation of a world for itself, and this world is a world of representations, affects, and intentions.[457] I will focus here on the role of representation, however, because what Castoriadis says on this point is particularly significant for the thesis of the machinic imaginary.[458]

Firstly, representation is not copy of the world but rather the "presentation by and for the living being, by means of which the living being—starting from what are for it only mere *shocks*, to take up again Fichte's term (*Anstoß*)—creates its own world."[459] In this process of representation, or presentation, Castoriadis writes, the "living being *creates* information *for itself*." This concept of information has parallels with Simondon's concept of information. What it means for a living being to create information for itself is that the subjective structure of the living being gives form to—in-*forms*—"the *X* of the shock and renders it present for itself."[460] This *X* is an element of the outside but is not information—the world is not given—but rather the outside acts as a

[456] Castoriadis, 1997d, p.332.
[457] Castoriadis, 1997e, p.149.
[458] However, briefly addressing those characteristics of intentionality: the machinic imaginary conserves/reproduces itself through the effects of its activity, and in machine learning, there is a minimal vectoral conservation to optimise a solution: a learning machine does not start to undo what it has learnt and begin a different process, it is not random but conserves a directionality. Acceptance/rejection to a 'signal' is, more obviously, found the selectivity of a learning machine to distinguish between redundancies and its determination of 'meaningful' signals in the data relative to its given task.
[459] Castoriadis, 1997f, p.257. The *Anstoß* in Fichte's philosophy is the shock of the 'I' encountering its own limitation, its own finitude, which sets in motion the consciousness of itself as finite. The *Anstoß* is the condition of possibility of consciousness (Fichte, 2021).
[460] *Ibid.,* p.258.

shock that triggers a process of in-forming the world for the living being; undertaken by the "formative capacities" of the living being, those capacities for imaging/imagining, presenting, and relating *legein*).[461]

Simondon describes a similar process of in-formation, in which the shock is an information-event catalysing a transductive process of ordering.[462] In the example of the physical individuation of a crystal, which Simondon discusses in *ILFI*, this information-event is a germ around which a supersaturated solution crystallises—becomes ordered. Physical individuation radiates out from a specific point (the germ) occurring only at the boundary between interiority and exteriority. The living being, on the other hand, has an "internal resonance" that organises the process of individuation, and as such "the living being resolves problems, […] by modifying itself, by inventing new internal structures, and by completely introducing itself into the axiomatic of vital problems."[463] It is in this way that "the living being performs informational work, thereby itself becoming a node of interactive communication between an order of reality that is superior to its dimension and an order of reality that is inferior to it and which it organizes."[464] This informational work can be understood as the process of signification, which generates the transductive operation: maintaining a structural relation between different orders of magnitude required for the process of individuation. Individuation is always a process of worlding; even if it is partial and incomplete, a world is expressed by individuation.

Ur-Signification

As per the above, and previous chapters, Castoriadis highlights the role imagination plays in societies instituting or creating themselves, and therefore how change can occur, and how societies can recreate themselves otherwise. He shows that this happens because of the creative potential of an indeterminate cosmos from which *legein* and *teukhein* can bring forth an indeterminable multiplicity of significations. It is though these significations that human societies can be created, as it were, *ex nihilo*.

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461 Castoriadis makes an ontological point worth noting: we cannot attribute form to this *X* of the outside, because form is "subjective" in the above sense of being created by the living being, but neither is it absolutely formless: "the *shock* cannot be, in itself, absolutely indeterminate and totally undifferentiated, for if that were the case we would be able to hear paintings and see perfumes." 1997e, p.148.

462 On Transduction: "By transduction we mean a physical, biological, mental, or social operation through which an activity propagates incrementally within a domain by basing this propagation on a structuration of the domain operated from one region to another: each structural region serves as a principle and model, as an initiator for constituting the following region, such that a modification thereby extends progressively throughout this structuring operation." Simondon, 2020, p.13. Concept of information-event from Mulder (2016) on Simondon.

463 Castoriadis, 1987, p.7.

464 *Ibid*., p.383, n.8.

However, Castoriadis only provides part of the picture, and is stuck in a certain anthropocentrism despite his placing of the radical imagination outside the individual human and his emphasis on the transsubjective field. What Simondon provides is a theory of signification or representation that radically exteriorises the *image*, locating it at an early stage of biological development, and outside of language. In his theory of the image-cycle, Simondon argues that the image is a function of the living organism in *general*, not just the human or other cognitively developed animals. This leads to a theory of imaginary capacities that are more primal than traditional theories of the image and imagination, in a very similar move to Castoriadis' description of the proto-imagination of the living being, including single-cell organisms, in his philosophy of nature.[465]

This idea stems from the ability of living organisms to distinguish which sense impressions from the environment should be stored and which can be forgotten. In other words, deciding what is meaningful: the in-formation of significations. In this Simondon and Castoriadis concur. In his later writings, Castoriadis shifts to a philosophy of nature, in which he discovers the prototype of the radical imagination in the living organism. In this later work there is, therefore, a broader role of imagination in Castoriadis' ontology than the social ontology of the imagination described in earlier works such as *The Imaginary Institution of Society*.[466] In a similar description of Simondon's theory of the image, the selection and exclusion of sense impressions Castoriadis discusses in the living being is a form of proto-meaning—*ur-signification*—which is a foundational proto-imagination originating in the most basic of biological processes.[467] As this proto-imagination is tied to perception of the environment, the perceptive capacities of an organism have a delimiting effect on what sorts of relations with the environment are possible, and thus how those relations become significations. Ordering of the world through selection and deselection is an example of the proto-institution of *legein* (distinguishing-choosing-positing-assembling-counting-speaking), the prerequisite of all social institutions. Stripped back to its core in the model of the simple biological organism, the aesthetic foundation in sensibility of *legein* is clear. To understand how machinic signification is analogous to the proto-imagination of the biological organism, the relation between aesthetics and logic/reason is a useful framing. The process of (proto-)signification that takes place in machine learning (discussed in more detail in the next chapter) has an 'aesthetic' foundation to the extent to which the capacities of a machine to interact with

[465] Castoriadis, 1986; Castoriadis, 2002.
[466] As Suzi Adams has argued, there is a decidable ontological shift in Castoriadis' thinking before and after *ISS*, the shift even taking place in the book itself. After *ISS*, his philosophy of nature takes a decidedly Whiteheadian turn (influenced by Merleau-Ponty), that extends the creativity to all regions of being. Suzi Adams calls this later ontology a poly-regional or transregional ontology, in that there are several regions of being-for-itself, or modes by which being expressed according to an idiosyncratic 'logic'. See Adams, 2011.
[467] Castoriadis, 2002, pp.61-66. Concept of proto-meaning is from Adams, 2011, pp.186.

the world is determined by the forms of signification that it can create (*legein*).

Simondon's description of the individuation of (cybernetic/mechanical) machines is different to his description of the living being, describing technical individuation an adaption to the environment by a change in relation to the milieu, rather than a reorganisation of *internal* structures. Simondon's description of machines is, however, inadequate to describe learning in machines because in such a case it is the internal logical and mathematical structure of the machine that is plastic and responsive to the environment, rather than the energetic communication between technical objects and their milieu. The logical, abstract individuation of a technical object is something Simondon did not consider because his analysis was based upon a particular type of (cybernetic) machine that functions as a mediation between two energetic domains, a paradigmatic example being an engine.[468] The mode of existence of computational objects like a machine learning model is closer to the living being in that it creates an interior organisation of the world as a communication between itself and its milieu. Transduction in machine learning takes places through the mathematical-logical in-formation of the structure of the network (the weightings or connections), whereas in an analogue machine like a turbine, transduction occurs in the energetic in-formation of two disparate energy states into a larger assemblage. The living being is different again in being a more complex synthesis of the energetic (analogical) and the logical. The in-formation of an ANN is the creation of patterns that function as significations in a transductive relation with the outside world. It is in this way that the machine becomes defunctionalised, and in turn becomes *expressive* as an articulation of a world. The next chapter is intended to give more weight to this argument by turning to a more empirical description of learning in machines.

Fungal Images

Finally, it is worth considering Simondon's theory of the image in more detail. As mentioned above, the role of the environment has a specific importance in the theorisation of signification that does not emanate from the subject but is rather a relational concept. The concept of the 'image' in Simondon's theorisation disrupts the category of the individual as the source of signification because the image is a transversal relation between the individual and its milieu. Most striking about his theory of the image-cycle is that he argues that the image has a quasi-

[468] While learning in machines was already being discussed in cybernetic circles (see next chapter), it does not seem that Simondon was aware of this discussion, or at least, understandably, did not foresee the profound significance that machine learning would have in terms of the mode of being of machines.

independent existence of its own, in that it is more than the image of consciousness.[469] He describes the latter *conscious* image as being like a mushroom, in that the fungus is in fact much larger that the fruiting body, with a mycelium that extends into the material substrate out of which the mushroom grows. Images conceived as mental content of which we have consciousness, he writes, are like

> exceptional cases of outcropping which are attached to a continuous substrate; they are attached to a base which carries them after having prepared them, like the visible part of the mushroom, carried by the more durable mycelium, and also more essential, and more universal, because there are mushrooms which do not produce this visible part, coming out of the ground; they proliferate none the less, their action on the environment is none the less powerful.[470]

This quasi-independent existence is useful for theorising social imaginary significations, in that we must understand signification as extending into the material substrate of the social imaginary, which includes the technological infrastructure embedded in everyday life. Signification can appear as conscious representation, but in most cases, signification is like the fibrous web of mycelium extending out into every aspect of society. This is the social imaginary as it exists in social action, and one of the material substrates into which this mycelium extends is computational infrastructure.

Take, for example, 'risk', arguably a primary signification of contemporary society.[471] Risk is an "operative signification", in that it exists first and foremost as social activity, in the calculations of insurance companies to underwrite a business, or in the calculation by security forces at a border that an individual is a "security threat", or the calculation that a certain area of a city has a higher probability of crime.[472] Each of these calculations, increasingly arrived at automatically using machine learning, leads to further action, extending, multiplying, and modifying the signification: a business is underwritten and deemed viable; a person is taken into a backroom and searched and their name entered into a database; a higher density of police patrol a neighbourhood, leading to more instances of stop and search and increasing the criminalisation of the neighbourhood's population. Each act extends, multiplies, and modifies the signification of 'risk' ('at risk', 'a risk', 'credit worthy', 'a national security threat', 'a criminal', etc.). Thusly, risk

[469] One of Simondon's main targets is the Jean-Paul Sartre's theory of the imagination (2010; 2012), as well other psychological theories of the image. See also Alloa (2021) for further theorisation of Simondon's concept of the image.
[470] Simondon, 2003, p.3 [translation my own].
[471] Beck, 1992.
[472] Castoriadis, 1987, p.141.

proliferates variously, risk is metabolised by machines and extended in new, often intensified manners. Inferences are made by connecting seemingly disparate data points—demographic, behavioural, contextual, and so forth—abstracting and dismantling aspects of the social world to then reaggregate them in the creation of new value formations, new *machinic significations*.[473] In such a manner, computational infrastructure supports the mycelium of social imaginary signification.

Computers, code, and the data generated by digital devices and machine learning are what Simondon describes as "image-objects". These are objects produced by humans that carry latent cognitive and affective significations. These image-objects, he writes, are themselves almost "organisms, or at least germs capable of reviving and developing within the subject. Even outside the subject, through the exchanges and the activity of the groups, image-objects multiply, propagate and reproduce themselves in a neotenic state, until they find the occasion to be reassumed and deployed at the imaginary stage by being reincorporated into a new invention."[474] Thus while Simondon grants these image-objects a quasi-independent existence apart from subjective consciousness, he still considers their reassumption by the human subject as the mode by which they are reincorporated into a new invention, be that cognitive, affective, or technical. These significations carried by image-objects serve as an excellent description of the 'subjective subtenancies' of which Massumi writes (discussed above). Additionally, however, my argument is that with machine learning *not only* are significations able to "multiply, propagate and reproduce themselves in a neotenic state", *machine learning is itself* a novel channel through which significations can be "reincorporated into a new invention" (i.e. without filtering through human subjective consciousness as such). This seems clear considering the increasingly dominant role of machines in the automation of invention, be that scientific, cultural, or industrial. If invention of technique is driven by processes not wholly controlled by human intention, this provides a fresh approach to understanding the imaginary institution of society in terms of the development of *teukhein* from the perspective of technology itself.

Simondon's writings on invention and imagination provide a different perspective concerning the relation between design, contingency, emergent technology, and culture. As opposed to the dialectical movement of accident and design found in Bratton (discussed Chapter One), Simondon's theory of invention, read alongside his philosophy of technical individuation,

[473] In the case of risk management Amoore makes the connection between financial derivatives as an abstraction and reaggregation as a process of value formation and the decisional reasoning of big data practices that create "data derivatives" (Amoore, 2011). These data derivatives are machinic significations that extend the primary social signification of 'risk'.

[474] Simondon, 2003, p.13 [translation my own]. Note here that, like Castoriadis, there is a materialist understanding of signification in the image-object: it is through *activity* that the signification of these image-objects multiply.

presents a relational ontogenetic account of the socio-technical world through the imaginative overcoming of problematics. Simondon's theory of invention is intertwined with his theory of the image, describing the latter as an organism interacting with his environment and coming up against a problematic which can only be resolved through invention. This moment of invention is a sociotechnical process, a collaborative endeavour of the human and the machine mediated by the quasi-autonomous image. This autonomy of the image points in the direction of imagination as an immanent force of activity that creates meaning; the image is a relational abstraction connecting an organism with its environment. Imagination is a process of coming into relation, both supported by images and productive of further images (images are *instituted* and *instituting*). This notion of imagination in Simondon is therefore not reliant on or derivative of human consciousness, which is only a specific manifestation of the transindividuation of images. Imagination is the transductive process by which information is produced, information being the site of meaning, the moment of signification. Signification being defined as actions within a collective individuation that "resolves the problem of separate individuals and is constituted as a symbol of other actions."[475]

This post-phenomenological notion of information functions as a bridging concept across physical individuation and vital individuation, through to the transindividual. Information is that by which individuation transverses the various regions of being: "significations [are a unification] of a disparate series of signals".[476] What happens to the subject in this analytical framework? The concept of the subject can undergo a transformation to subjective tendencies that traverse being as transductive moments of information. Simondon describes the subject as the "milieu and agent of the progressive discoveries of signification in the signals that come from the world".[477] The subject, for Simondon, is not the individual, but rather this moment of unification of signals into significations. In this regard the subject also manifests as a process that extends across a collective, across a system of individuals in a relation of transindividuation: "signification is not of the being but between beings, or rather across beings: it is transindividual."[478] It is in this sense that Massumi's concept of subjective sub-tendencies, discussed in the previous chapter, can be applied to processes within computational systems as much as within the human psychic domain of social life. Any one machine might be simply the conduit of inputs and outputs of signals, but at the level of collective individuation (which includes vital-psychic human individuation) these signals resolve into a relational signification as social doing. Likewise, the

[475] Simondon, 2020, p.243.
[476] Simondon, 2020, pp.249–250 as cited in Bardin, 2015, p.52.
[477] *Ibid*., p.293
[478] *Ibid*., p.344.

constitution of the transindividual is the a broader synthesis of disparate phases of being enveloped in signification. The social imaginary is transsubjective in that through, or *as*, signification, it bridges disparate phases of being. Simondon includes within this transsubjective process of signification the pre-individual milieu, the individual organism and the cultural and technical. I am designating what Simondon terms the 'cultural' (human) and technical as the psycho-biological-human imaginary and the machinic imaginary for analytical purposes. However, these are not fundamentally separate, both are aspects of the transsubjective social imaginary. While at the level of the social imaginary there is a unification as signification, the two disparate imaginaries, or modes of being, are never fully integrated and unified, instead they exist in a metastable equilibrium of social imaginary signification. The persistent disparation within the metastable equilibrium of the social imaginary is an underlying concern of Part III of this thesis, which seeks to define the problematics for thought and action produced by the machinic imaginary.

Conclusion

The purpose of this chapter was to begin to apply the post-phenomenological framework to computational society, working towards the speculative proposition of a machinic imaginary. Part II's overall function within the thesis is to describe the machinic imaginary, and therefore this chapter began to introduce the conceptual tools that will be refined in their use over the following two chapters. The first half provided a theoretical description and analysis of social imaginary and a defence of the idea that machines produce a distinct form of signification that is unique to a machinic imaginary beyond the horizon of human experience. The ontological dimension of the problem of the machinic imaginary then considered in the second half of the chapter.

Castoriadis' theory of social imaginary significations was examined in more detail, highlighting the emphasis on their dynamic character emerging from *social doing* (in all its guises from physical activity to abstraction). Social signification as a transsubjective property of social doing can, therefore, be instituted by non-human actors if they are participating in production and reproduction of the social field. Machinic signification is a new form of social imaginary signification that emerges within computational society with the advent of computational systems generative of social relations. What constitutes them as properly machinic is the degree to which they are significations *for machines alone*. With increases in machine-to-machine interactions and increasing complexity of machine learning classification systems underpinning

large portions of social activity, such significations circulate between machines unrecognised or uninterpretable by human actors.

Detached from the human body as a locus of meaning, machinic signification is infrastructural and disturbed, emerging as a transversal relation between domains of social activity. The machinic imaginary must, therefore, ultimately be figured through the lens of (social) ontology. The framework of poly-regional ontology proposed by Castoriadis and Simondon provides an ontogenetic account of difference, highlighting the expressive and creative dimension of being in various modalities. Drawing on a shared reading of the pre-Socratic concept of *physis*, both argue for an ontology that attends to the expression of being as a process of determination. Such determinations of being are defined by the logical-aesthetic capacities or dispositions that emerge as different regions of being (biological, psychical, social, technical). Simondon makes a case for a technical mode of being that is transindividual and folds in human experience. My argument that this technical mode of being creates a phenomenologically distinct world-for-itself that is sits across the transindividual field of techne and culture, as Simondon describes it, but also closes itself off due to radically non-human machinic logic-aesthetic by which it determines a world. The implied corollary is that to grasp the full implications of a pluralist poly-regional ontology it is important to not unthinkingly reassert monism, but to emphasise the genuinely insurmountable difference between regions.

The notion of being-for-itself situates learning in machines and the machinic imaginary in relation to the post-phenomenological thrust of this thesis. Namely that any attempt at an elucidation of the social-historical world horizon must attend to its poly-regionality. The social-historical is not to be understood as a univocal being, but instead as multivocal and transsubjective, with a plurality of modes of being articulating the world according to their own logic. Hence, any study of the transsubjective world horizon must be from a multi-logical perspective, as discussed in the final two chapters.

The social-historical, while a mode of existence that is of its own macro-order (a being-for-itself), is at the same time constituted by the micro-process of social activity. The following chapter explores the micro-dynamics of machine learning as forms of social activity understood as subjective sub-tendencies that, in aggregate, constitute the transsubjective field of the machinic imaginary as it is disturbed across social being. After considering these microscopic dynamics of machinic social imaginary signification, the following chapter will shift to the macroscopic dynamics created as a consequence of machine learning as it increasingly penetrates and underpins the infrastructure of all aspects of social life.

Chapter 5: The Individuation of the Machinic Imaginary and its Entry onto the Social-Historical Plane of Becoming

> To a certain extent even the evolution of societies, stuck, up till now, on a determinism of youth, then of maturity and finally of old age, along with the political and social regimes corresponding to each, *can no longer be conceived as fatal if the penetration of technics is deep enough to introduce a system of references and values that are independent of this implicit biologism*.[479]

The previous chapter presented the conceptual language needed for the development of the thesis of machinic signification, and the notion of being-for-itself was introduced. The following aims to consider the history of machine learning to describe the gradual emergence of a new mode of being-for-itself conditioned by certain capabilities built into computers. These capabilities enable world articulation by machines. Each invention, each step in the direction of machines that can learn, was a step towards a machinic imaginary. While the worlds created by individual learning models are fragmentary in their narrow focus, together they constitute a proliferation of machinic subjective subtendencies from which the machinic imaginary institutes itself.

The complexity and richness of the history of machine learning cannot be given its full justice here.[480] More importantly for the purposes of this chapter and the next is that the history of learning in machines and computational media infrastructures can be read as the individuation of the machinic imaginary, as it emerges onto the social-historical plane of becoming. The ingression of computational systems into the social-cultural milieu has been a socialisation of computational systems. This process of socialisation of machines has been facilitated by the adaptive and interactive characteristics of contemporary computation augmented by machine learning techniques.

The technical development of machine learning is central to this story because of the profound and transformational role it has played in the forms of automation now possible, and because it now dominates the field of AI in the twenty-first century. The bottom-up approach of machine learning (and artificial life) is a much more autonomous process of creation that facilitates the

[479] Simondon, 2016, p. 126 [emphasis added].
[480] For further historical details see Cardon, *et al.*, 2018.; Kelleher, 2019.; Mitchell, 2019. On the historiography of AI, see Plasek, 2016.

articulation of a world-for-itself of machines, i.e. creating a set of imaginary significations that, albeit operating in the transsubjective domain of the social world, collectively articulate a certain set of social relations only comprehensible within their own mode of operation. Machine learning therefore has a significant role to play in the institution of the machinic imaginary.[481]

Despite the increasing autonomation of computational infrastructures, the complex adaptive dynamics of large-scale computational ecologies (discussed in Chapter Six) do still include the activity of humans—developers, users, subjects of data harvesting, database managers, low-wage workers labelling data, and a whole host of other roles.[482] Humans remain a key component of large-scale socio-technical systems alongside the machines, and thus both must be considered in any analysis. However, much has been written on the human dimension of the social imaginary and of the role of human norms, values, and intentionality in the design and application of computational media.[483] Instead, the aim of this thesis is to speculate about the existence of a human-independent machinic imaginary. While the human dimension should be considered in the final analysis, the core focus in this chapter is on the institution of the computational dimension of the social imaginary.

In tracing a history of the machinic imaginary the aim is to explore the way machines have come to make 'sense' of the world, and therefore how computational sense-making is a form of world articulation (in the manner discussed in Chapter Four). This is not a history of artificial intelligence *qua* the scientific search for the production or simulation of intelligence in machines. Artificial *Intelligence* is a somewhat misleading term in that the concept of intelligence is ever shifting, in part due to the scientific field of AI itself, as well as cognitive science.[484] This thesis is instead concerned with the socio-cultural effects of computational information-processing machines in terms of what sort of politics of the imagination are possible if computers are articulating the world differently to how humans represent or articulate the world; especially if this machinic articulation is beyond the world horizon of human experience. To understand the basis of this concern, the following historical narrative is directed towards a speculative post-phenomenological description the conditions of possibility for a machinic imaginary to emerge. First, by considering how learning in machines produces vectors of signification (subjective subtendencies). And in the following chapter, with a study of the interactive dynamics of

[481] Moreover, as Jenna Burrell argues, machine learning is also of critical relevance considering the role it plays in the types of decision it automates—mostly classification tasks—which have socially consequential outcomes of particular salience regarding the politics of algorithmic capitalism; for example, who is deemed eligible for a loan, who will be detained by boarder security, how certain resources will be allocated within a population. Burrell, 2016.
[482] Crawford, 2021.
[483] For example: Benjamin, 2019.; Dorish, 2017.; Grey, 2019.; Montford, 2013.
[484] As well as other fields studying non-human intelligence, see for example: Trewavas, 2015.

computational systems embedded in the social world.

This historical narrative will necessarily remain at a certain level of generality to cover the necessary ground. However, it is still worth including selective examples in which more technical detail is given. These examples have been chosen as they are each illustrative of when a certain threshold of (proto-)world articulation was reached by individual instances of machines/computer programmes. These individual instances of proto-world articulation in machines are probe heads searching their own small corners of the large problem space that is the machinic imaginary. Only when these subjective subtendencies are taken collectively as patterns of social activity articulating a world, does a machinic imaginary emerge that constitutes a genuine being-for-itself.

Germs of Machinic Being-For-Itself

In 1936 Alan Turing's article 'On Computable Numbers, with an Application to the *Entscheidungsproblem*' was published, laying the theoretical foundations for the modern digital computer. Not only was Turing's output during this period significant in the development of the digital computer, Turing also speculated upon the range of capacities for intelligence that might be displayed by such machines, as well as the idea that machines could learn.[485] Turing dared to imagine what such thinking machines might possibly do, much like Ada Lovelace did while working with Charles Babbage on the practical development of such a machine ("The Analytical Engine") nearly a century before.[486] The creative theorisations of individuals like Lovelace and Turing were the germs of a crystallisation of an imaginary of machines that could think for themselves: a new mode of being-for-itself. The idea of thinking machines about which they and others were speculating, was the idea of an expressive mode of being articulating a world. Of course, the mere speculation on machines was only the start, the imaginary of such a mode of being elicited attempts to bring such a mode of being-for-itself into existence. That (ongoing) attempt is the history of AI.[487]

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[485] For example, his essay on machine intelligence: 'Computing Machinery and Intelligence' (1950). He also wrote 'Intelligent Machinery' in 1948, which was far ahead of its time, including the concept of "unorganised machines", which would later be independently realised as ANNs and genetic algorithms. However, this text remained unpublished in his lifetime, only published decades later in a collection of his essays in 1992. Therefore, while conceptually interesting, its historical relevance in the development of these ideas is less significant (Turing, 1992 [1948]).

[486] Lovelace, 1966[1842].

[487] It is in this regard that Castoriadis makes the controversial claim that the radical imaginary creates *ex nihilo*. A meaningful relation or *eide* which did not exist is brought into being by the creative capacity of the imagination in a radically creative way that does not make sense if the world is understand simply as the transformation of matter.

This imaginary of the being-for-itself of machines spread through publications, varied practical attempts to implement this idea of thinking machines in practice, and fluctuating levels of institutional and state support and funding of scientific and commercial projects.[488] As a consequence, a series of social imaginary significations about machines that could think would come to be instituted, which in turn would eventually lead to new forms of media that could create imaginary significations. These media have evolved to such a level of complexity that a phase transition has occurred: there is now the possibility of the institution of significations exclusive to the dimension of the being of the machines themselves. In this way, the machinic imaginary, actualised in contemporary computational infrastructure, has its roots in the creative capacities of humans to imagine another mode of being-in-the-world. This is an example of the recursivity of the social imaginary in that it is an ongoing process of auto-institution, creating the conditions for further institution. The individuation of the social imaginary is necessarily a process of differentiation—in that the social-historical is an open, heterogeneous, metastable system—and within that process of self-differentiation are moments when the social imaginary creates within itself something which is radically other. The emergence of the machinic imaginary is such an event.

The early years of AI and modern computing: ~1943–1971

Following Turing's publication, in the 1940s and 1950s, the practical development and use of electronic, stored-program computers began that processes of building the material and practical foundations of the machinic imaginary. These machines were the first instances of actualising a programmable logic in electronic hardware. This logic was programmable in that it was based on Boolean logic gates that could be built with electrical circuits (originally using vacuum tubes and later silicon circuitry).[489] Logic gates are at the core of digital computing, and nearly all of the devices in contemporary computational society run on hardware that, at the most basic physical level, are an implementation of logic gates in silicon circuitry. At the micro-scale of individual machines that learn, a fragment of world is articulated within the range of possible combinations of logic gates, and according to the constraints of the given technique, model, and data set. This highlights how the machinic imaginary is emergent from a form of information processing that

[488] Ceruzzi, 1998.

[489] A Turing machine does not have to be implemented in digital circuitry, see for example DNA computing or Charles Babbage's pure mechanical "Analytical Engine". However, due to historical circumstances the development of electronic digital computing was facilitated by the availability of electronic components like vacuum tubes, and the current understanding of electrical engineering in the early decades of the 20th century, as well as the low-latency of electrical signals.

fundamentally differs from the non-deterministic bio-chemical processes running on the wetware of the human brain. This difference is important for the post-phenomenological theorisation of the machinic imaginary because world articulation is derivative of the affordances of a particular entity—its logic-aesthetic—determined by the material parameters of the encounter between said entity, or system, and its outside. In this case, while digital computation is substrate independent in that one can run the same programme on any computer, there is a material and logical limitation defined by the need for some form of physical implementation of logic gates.

During these initial years of research into electronic, stored-program computers and related fields, several foundational ideas and practical projects were also developed, eventually leading to forms of machine learning generative of the machinic imaginary. As John D. Kelleher notes, this early period significantly shaped the development of the field today in terms of initial directions of research.[490] During this period the basic structure of an artificial neuron was defined as "a weighted sum of inputs fed through an activation function".[491]

A popular recounting of the history of machine learning often begins with the work of Warren McCulloch and Walter Pitts on ANNs. Their text "A Logical Calculus of The Ideas Immanent in Nervous Activity"[492] was foundational because it provided a description of a neuron using propositional logic. Influenced by Leibniz's idea that any task that can be completely and unambiguously described in words can also be described using logic, they applied this principle to the neural activity of the brain.[493] The logical description was predicated on the "all-or-nothing" activity of a neuron, meaning that it is activated at a certain threshold. This meant that ANNs could be built using Threshold Logic Units (TLUs), which had an activation function that would activate the unit when a certain threshold was reached in the input signal.

A few years later, in a 1949 book titled *the Organisation of Behaviour*,[494] Donald Hebb proposed the idea that networks could learn internal representations of concepts—"cell-assemblies"—which were "subfamilies of neurons that would learn to support one another's activity".[495] This is a conceptual turning point in machine learning, if not a technical one, as it is the first time the idea

[490] Kelleher, 2019, *Deep Learning*, p.122 Many of these ideas, techniques, and algorithms still subsist in some form in contemporary technologies, relatively unchanged. For example, the proposal of learning algorithms to be based on iteratively adapting weights such as practical learning rules like the least mean square algorithm (LMS) and gradient descent.
[491] *Ibid.*
[492] McCulloch and Pitts, 1943.
[493] Lettvin, 2000, p.3.
[494] Hebb, 1949.
[495] Minksy and Papert, 1988[1969], p.ix.

of internal representations was proposed. However, it would not be until much later, during the connectionist era, that any internal sub-symbolic representations of concepts would be achieved (and not quite in the manner that Hebb described them).[496] The question of internal representations and how it relates to social imaginary significations requires more attention and is considered in detail below.

The fifties saw a flurry of intellectual activity laying the groundwork for the emergence of the machinic imaginary. Although ideas of thinking machines and their capabilities had previously been speculated upon (by Leibniz, Lovelace, Turing and others),[497] the theoretical discussions of this era were a milestone in the modern conceptual birth of AI and machine learning. In 1955, the Western Joint Computer Conference (WJCC) was held in Los Angeles, USA.[498] This was an important event early in the history of modern machine learning as it included a session on 'learning machines', the intention of which was to "to describe certain experiments in which machine systems imitate some of the self-organizing and learning processes of the nervous system."[499] One of the papers from this session was given by Oliver G. Selfridge, outlining the process of "pattern recognition", and proposing that the solution to building machines capable of pattern recognition is essentially a learning process taking place within a computer:

> […] pattern recognition involves classifying configurations of data into classes of equivalent significance so that very many different configurations all belong in the same equivalence class. I repeat our definition: Pattern recognition is the extraction of the significant features from a background of irrelevant detail.[500]

Selfridge thus links pattern recognition to the idea of signification. A feature in the data—a certain configuration of a handwritten letter, for instance—has significance to the degree it sits within an "equivalence class", which is a pattern that can be discerned across a variation of isomorphic features—the class of possible configurations of the handwritten letter 'A', for example. As Gerald Paul Dinneen, a colleague and collaborator of Selfridge, explains in more practical language:

> A pattern is an equivalence class consisting of all those configurations which cause the same output in the machine. For example, if the machine had just two outputs, yes and

[496] Smolensky, 1988.; Mitchell, 2019, p.25ff.
[497] For this pre-history see: McCorduck, 2004.
[498] One of a series of annual conferences of the same name held on the west coast of the USA. Its twin series the 'Eastern Joint Computer Conference' was held in various locations in the east of the country.
[499] Ware, 1955.
[500] Selfridge, 1955, p.92.

no, then one pattern would be all those inputs which caused the machine to say no.[501]

The equivalence class is not an "ideal" type[502] that all instances are measured against but rather a class of configurations attributed the same contextual value—e.g. they all "cause the machine to say no." Significance, therefore, "is a function of, first, context, and second experience."[503] It is contextually defined within the equivalence class, and this context is constructed by the *activity* of pattern recognition, which to follow Selfridge constitutes a form of experience. While said patterns could be said to exist in the data prior to its processing, the process of extraction of significant features from the redundant background is integral to those patterns being constructed as *significant* patterns. In other words, pattern recognition is a process of *ur-signification*, in the sense described in Chapter Four, and the institution of *legein* (distinguishing-choosing-positing-assembling-counting) in machines. These significations are idiosyncratic to the internal logic of the required task, and the *means* by which that pattern recognition is achieved: i.e. the activity itself is part of the process of signification. In this regard, machine learning as a patterning foregrounds the possibility of a machinic imaginary. If one were to "penetrate the labyrinth of the symbolisation of the imaginary", as Castoriadis writes, one arrives finally at the "the organizing patterns that are the conditions for the representability of everything that the society can give to itself."[504] In the case of the machinic imaginary, those organising patterns can be found in learning machines.

A few years later in 1958, at a four-day seminar series was held in the UK at the National Physical Laboratory, Selfridge gave a paper titled "Pandemonium: A Paradigm for Learning".[505] Although Selfridge and others had been working on the problem of building machines that could learn for a few years, as evidenced by the work presented at the 1955 WJCC, this particular paper made a strong impression, and is generally seen as founding moment in the field of machine learning. In the talk, Selfridge described a model of learning designed "to recognise patterns which have not been specified". Much like in his 1955 paper at the WJCC, this idea of pattern recognition was related to a notion of signification, but in this case, it was defined in the following manner:

> We use the term pattern recognition in a broad sense to include not only that data processing by which images are assigned to one or another pattern in some set of patterns, but also the process by which the patterns and data processing are developed by the

[501] Dinneen, 1955, p.94.
[502] Mendon-Plasek, 2020, p.38.
[503] Selfridge, 1995, p.92.
[504] Castoriadis, 1987, pp.142–143.
[505] Selfridge, 1961.

organism or machine; we generally call this latter 'learning'.[506]

During this same seminar series, American psychologist Frank Rosenblatt also gave a paper, titled "Two Theorems of Statistical Separability in the Perceptron".[507] Working at the Cornell Aeronautical Laboratory, in Buffalo, New York, Rosenblatt had built an "artificial brain" called the "perceptron". The perceptron was a "probabilistic system, capable of learning to recognise and differentiate stimuli in its environment."[508] The initial approach to the perceptron was to use fixed-threshold neurons after the model of McCulloch and Pitts. In his paper, Rosenblatt proposed a new, theoretical perceptron using a conceptual "continuous transducer neuron". This theoretical perceptron would be able to "arrive at a 'useful' division of its environment, without human intervention",[509] which is the minimal condition Rosenblatt provided in his definition of a system with the "spontaneous ability to improve its ability to organise."[510] In this he was proposing "a system which is capable of reorganizing its own logic, to correspond to a logical organisation which already exists in the universe around it."[511] This would be a process of creative learning in the machine, based on a "conceptualisation of the environment", which is "the first step towards creative thinking". Rosenblatt differentiates his original perceptron from this new perceptron, in terms of the ability for "spontaneous concept formation".[512] Rosenblatt's approach, while different in certain respects, very much echoed Selfridge's ideas about learning.

These spontaneous concepts or patterns are theorised as being generated by the machine itself, in an act of creative formation of an internal organisation in relation to an external organisation (the data set). The organisation of the external milieu of the data set or environment 'in-forms' the learning machine by providing a force (albeit one that is abstract and mathematical) that 'moulds' the internal organisation of the learning model. This is an example of Simondon's description of the process of transduction that engenders individuation (as discussed previously). While Selfridge and Rosenblatt's ideas are early theoretical speculations, the general model they describe is found in current machine learning techniques, which, I argue, should be understood as individuation (albeit abstract and mathematical-logical). Moreover, pattern recognition is an instance of worlding that creates a proto-meaning in that it in-forms an interiority that defines how it will interact with its outside in future instances. In this way, learning in machines engenders an embryonic region of being-for-itself, which conditions the possibility of the

[506] *Ibid.*, p.514.
[507] Rosenblatt, 1961.
[508] *Ibid.,* p.421.
[509] *Ibid.*, p.411.
[510] *Ibid.*, pp.423–424.
[511] *Ibid.*
[512] *Ibid.*

machinic imaginary in general. As mentioned in the previous chapter, a property of being-for-itself is self-finality. Learning in machines still lacks this aspect, so the description of learning given by Selfridge is not a complete description of a being-for-itself, but rather a proto-being-for-itself. The abstract figure of learning in machines is the pre-individual phase of the machinic imaginary, which is, I argue *is* a genuine being-for-itself.

The practical attempts to build learning machines during this period led to the recognition of the limits of single layer nets that were only able to solve linear functions.[513] Multi-layer nets were needed to overcome this limitation, however, before they could be built, the credit/blame assignment problem needed to be resolved.[514] This problem remained unsolved during this initial period, significantly limiting the capabilities of the experiments in ANNs. The solution, backpropagation (explained below), was not introduced until the second period in the history of machine learning. Backpropagation would prove to be significant not only on the technical level, but because it introduced *sub-symbolic* representational capacities of a novel temporal and spatial character into computing and machine learning. It is to the development of these ideas I will now turn.

Time, Space and Experience (~1980–2006)

If learning in machines is to be understood as a being-for-itself, this entails at the very least a minimal degree of experience of the world defined as a logical-aesthetic determination of a world through interaction with an environment. Experience is a temporal phenomenon, and change must occur for experience to be self-differentiated enough to exist as experience. Learning is a process that is inherently temporal in that it has a task-oriented end goal towards which it is tending. At its most basic, machine learning is a slow gradient descent toward a solution in a problem space: the gradual adjustment of the weights of a network until they adequately converge on the training data, such as in Rosenblatt's perceptron.[515] A general trend in the history of machine learning is the increasing complexity of temporality in computational processes. As machine learning techniques developed, the temporal relation of input to output and the movement across layers of the network became more sophisticated, thus allowing for more complex representations with non-linear functions. Accordingly, a consideration of time in machine learning can offer insight into the emergence of the subjective-subtendencies that

[513] Minksy and Papert, 1969.
[514] This is the problem of how one attributes credit or blame to a modifiable component of the model in its success or failure, e.g. which weight needs adjusting in a hidden layer? See Schmidhuber, 2015.
[515] Rosenblatt, 1958.

constitute the machinic imaginary.

Alongside the question of time in machinic world articulation, there is also a spatial element to consider. The way ANNs construct a presentation of the world is spatial, distributed across the network in the weighted connections between neurons in the network. Moreover, in an ANN there are multiple layers of abstraction and representation. "In a deep learning network with multiple hidden layers, each subsequent hidden layer can be interpreted as learning a representation that is an abstraction over the preceding layer."[516] The complex mappings that can be learnt by a network are a sequential layering of these abstractions upon one another. Furthermore, the development of the temporal sophistication of techniques for learning accompanied a complexification of the spatialisation of representation, by moving beyond networks with a depth of only two hidden layers. These developments happened in a period form the 1980s onwards, after nearly a decade of minimal research activity into machine learning—largely due to cuts in funding—known as the first 'AI winter'. With the advancement of several new ideas, ANNs began to be reassessed as a viable option under the banner of 'connectionism',[517] eventually leading to the hegemony of the deep learning paradigm in the twenty-first century.

Japanese computer scientist Kunihiko Fukushima published an influential paper at the start of this revival of connectionism in 1979, introducing an ANN model called the Neocognitron.[518] Fukushima's approach to machine learning was to replicate the structure of the visual nervous system, a model for which had been proposed in the early 1960s by neuropsychologists Hubel and Wiesal.[519] The Neocognitron consisted of layers of simple "S-cells" and complex "C-cells" mimicking the structure of the visual cortex, which Hubel and Wiesal had discovered consisted of specific cells for the detection of specific features, like edges, lines, motion, or colour. Multiple layers of these cells work together in a cascade of feature integration of increasing complexity, S-cells extracting simple features, linking to the complex features of C-cells. For instance, in the detection of the character 'A', there would be an S-cell that detects the top triangular shape of the 'A', another for left-sloping horizontal lines, another for the cross-section of a left-sloping line and a horizontal line, and so on. The output of the S-cells would then feed

[516] Kelleher, 2019, p.133.
[517] Connectionism was a term that had already been in use in the psychology of learning since the turn of the century. In AI research, it is most simply described as an approach to the simulation of 'intelligent' behaviour as an emergent property of interactions between large numbers of simple processing units (e.g. artificial neurons) when exposed to stimuli (data). The examples of machine learning discussed above were also therefore connectionist, but the term became more prominent with the development multi-layer networks during this period.
[518] Fukushima, 1979, published in English a year later (Fukushima, 1980).
[519] Hubel and Wiesel 1962.

into C-cells integrating them into a higher-complexity feature detection.

This feature integration is the basic model that many contemporary machine learning techniques use for a range of pattern recognition tasks beyond the visual. However, there are different ways that features can be represented in a network. The direct representation of a simple feature by neurons (the S-cells) is referred to as a 'localist' representation.[520] A localist representation is a direct "one-to-one correspondence between concepts and neurons".[521] For example, defining z by two categories x^n and y^n: z1= x1+y1, z2 = x2+ y2, …[522] In such a case one can theoretically point to a neuron and say that it is representing *x*, and another that is representing *y*. Practically, however, such legibility of an internal representation is much more difficult when the feature being represented by a neuron is highly abstract and unintuitive.

This legibility becomes even less feasible with 'distributed' representation, first introduced in the seminal book *Parallel Distributed Processing*.[523] In this representational paradigm an individual neuron is meaningless, instead a concept is represented across the connections between neurons, the weights of each of those connections, and the relative activation thresholds of each neuron. Different concepts are represented by a *pattern* of activity over the same set of neurons. A single concept will be represented by the activation of a specific group of neurons, but a single neuron can be activated in multiple patterns representing different concepts.[524] This means that, unlike conventional computer memory, "patterns which are not active do not exist anywhere…so it is impossible to point to a particular place where the memory for a particular item is stored."[525] Distributed representation is therefore *sub-symbolic*; signification resides in the relational patterns of activity, not as a fixed, atomic symbols that act as direct representations of concepts.

The developments in connectionism *qua* distributed learning during the period from the 1980s onwards was a decisive moment in which machines begin to articulate ever more abstract and complex internal models of the world. Moreover, distributed representation in ANNs serves as a useful analogy for how the machinic imaginary creates a world for itself: the machinic imaginary does not preside in any one machine but is an emergent feature of the complex dynamics of large-scale machine ecologies, as discussed in the next chapter. This distribution makes it

[520] Although it should be noted that the Neocognitron does not have to use localist representation, as we will see with CNNs, based on the Neocognitron, representations can be distributed as well as localist (and it is still not entirely clear how CNNs are mapping features). For a study of representations of features in CNNs, see Rafegas, *et al*., 2020.
[521] Kelleher, p.129.
[522] Where x designates the first hidden layer and y designates the second hidden layer in a network with the structure: Input layer → x layer → y layer → output.
[523] Rumelhart, McClelland and PDP Research Group, 1986.
[524] Kelleher, p.129.
[525] Hinton, McClelland, and Rumelhart, 1986, p.80.

impossible to pinpoint specific machinic signification; *the machinic imaginary is constituted by the patterns of interactions between machines*. The distributed, sub-symbolic nature of machinic signification is a crucial point I return to at the end of this chapter, and in Chapter Seven, where it reappears in the form of the problematic of the illegibility of machinic signification by humans. Illegibility is a defining feature of the machinic imaginary and its central problematic.

Another key development in connectionism during the same period was the backpropagation algorithm. Backpropagation was central to the re-emergence of ANNs in the 1980s as a field of study and the establishment of connectionism as the dominant field of research because it solved the exclusive-or (XOR) problem, which had limited early attempts at building multi-layer perceptions.[526] Early networks were capable of solving linear-functions, but tasks that require a non-linear function, like XOR, require higher-dimensional representation. This is only possible using a network of more than two layers. However, a subsequent problem arises with a multi-layered network as regards the training of 'hidden layers' (layers other than input or output). Known as the credit assignment problem, the issue is how to adjust the hidden layers of a network so that those causing error are correctly adjusted. The backpropagation algorithm solves this problem by iterating backwards through the network after each forward pass, readjusting the weights and biases of the model (the parameters). It is, therefore, arguably the most important algorithm for deep learning as it allows networks to get deeper, in turn making more complex representations possible.

Backpropagation was discussed in *Parallel Distributed Processing* in relation to Recurrent Neural Networks (RNN's) in 1986. In France, a postgraduate researcher by the name of Yann LeCun also introduced the backpropagation algorithm in his doctoral thesis in 1985.[527] LeCun had been inspired by Fukushima's Neocognitron but noted that it needed a better learning algorithm. By applying backpropagation to a Neocognitron-type architecture he produced the model of what is now known as a convolutional neural network (CNN).[528] CNNs have proven to be particularly effective for machine vision tasks such as image recognition and object classification, as well as other data sets mappable on a grid, such as recommendation systems. This is because CNNs work by iterating through a grid of data (such as the pixel values of an image) to produce a filter

[526] The XOR problem was at the core of the Minsky and Papert's critique in *Perceptrons* (1969). The limitations this problem caused for learning certain representations was a major reason that research into ANNs waned, leading to the first so-called "AI winter".
[527] There are several claimants for the invention of backpropagation, all of whom seem to have simultaneously arrived at the solution independently. It was introduced by D.E. Rumelhart, G.E. Hinton, and R.J. Williams (1986) in Chapter 8 of the *PDP* book, but also proposed by Parker (1985). The standard backpropagation algorithm used today was written by LeCun (1985) in his doctoral thesis. However, these were really "rediscoveries" of earlier techniques applied to ANNs, see Schmidhuber, 2015.
[528] Mitchell, 2019.

map (features extracted into a kernel function). This is repeated for different features of the image and the kernel functions are combined (hence the name convolution).[529] This means there is a particularly spatial logic at work in solving problems using CNNs: the sorts of significations constructed within a CNN refer to relational qualities of objects in space. The current success of CNNs in many different tasks taps into the underlying spatial logic of culture itself.

However, not all tasks are best approached through a spatialisation of the data, some problems require the ability to process data that has a serial quality. In this regard, RNNs are an approach to ANN architecture particularly useful for temporal or order-dependent problems, such as speech recognition. For problems like character recognition, a standard feedforward network can learn a set of patterns activated by the relevant input patterns. In temporal problems like speech recognition or translation, the order of the input and output are important—the meaning of a sentence is dependent on the order of the words.

Temporal problems are solved in RNNs by looping the output back into the input so that the next input includes a new input and the output of the previous pass as another input. The input layer feeds into a hidden layer, this hidden layer feeds forward into the output layer, but also stores the output of the hidden layer by looping back as an input (i.e. the loop is a short-term memory). Thus, with each iteration of the network running from input to hidden layer the hidden layer is also given as an additional input. This is the past state of the hidden layer rebounding on the adjustment of the hidden layer a second time, compounding the relation between each iteration so that they become double, or multiple. This is also a recursive relation between the past and the present being fed forward to produce an output. The output is situated doubly in the context of past and present inputs. This process produces a short-term memory, but RNNs like Long Short-Term Memory (LSTM) models can extend the range of the memory much further.[530]

Thus, with the advancement of the connectionist approach in the 1980s and 1990s, learning machines began to be able to articulate ever more complex worlds. The proto-worlding of an RNN has a temporal dynamic, incorporating time into the significations it creates about the world. CNNs, on the other hand, allow for ever more sophisticated machine vision and other such tasks based on spatial pattern recognition, therefore opening a new aesthetic realm for machines (in the etymological sense of the term *aesthesis* as discussed in Chapter Four).

Machine learning produces a representation based on a logic of abstraction, i.e. activation

[529] LeCun *et al.*, 1989.
[530] Hochreiter and Schmidhuber, 1997.

functions, weights, etc. In post-phenomenological terms this is equivalent to the process of abstraction that articulates a world; the "outside" is not directly represented as such, but rather the world is presented, or articulated, according to the affordances (logics) of a particular subjective process. For example, a tick articulates a world based on the perceptual faculties that it possesses in its Haller's organ (detection of carbon dioxide, ammonia, or pheromones, sensitivity to humidity, and infrared vision).[531] As does a human according to a different set of perceptual faculties in conjunction with the neural architecture of the brain, embedded in and mediated by culture and technology (i.e. the social imaginary). An ANN articulates the world according to the model's architecture—whether it is a CNN or an RNN, for instance—and other hyperparameters (e.g. learning rate, number of neurons, activation function) set by the programmer.

Individually these learning techniques are piecemeal, only able to articulate fragments of world with specific significations expressed according to their logic, rather than richer and more complete phenomenological worlds. Like a human individual, an ANN is embedded in the broader cultural context of the social imaginary, which plays a part in the data it is processing. Even in 'laboratory' conditions, its enculturalisation is enacted by the types of sensors or techniques used to capture said data, and the decisions made by human programmers in designing the architecture and setting the hyperparameters. What sort of world emerges from the interaction of many such models operating in the world? This interactive dynamic has started to play out as the ideas of the connectionist era have begun to be realised in the current era. Thanks to ever more powerful computers, trained with larger and larger data sets—alongside large capital investment across industries and general hyped-up marketing—learning machines have proliferated and are now embedded into everyday social life. This profusion of subjective subtendencies into the social world creates the conditions for the emergence of the machinic imaginary.

Deep Learning (Third Era: 2006–present day)

The bottom-up approach to AI, previously called ANNs during the period of cybernetics, and later connectionism in the 1980s and early 1990s, has now developed into a set of techniques and

[531] Uexküll, 2010.

network architectures referred to as "deep learning".[532] This new wave of research is a direct descendent of these earlier waves and the core architecture and algorithms (such as CNNs, Least Mean Square (LMS), gradient descent) are continuous in many models.[533] However, transformer models have made significant gains over RNNs in order-dependent tasks like natural language programming.[534] Rather than processing data sequentially, they use an 'attention' function that links contextualising tokens (words or phrases) to other tokens for more accurate prediction of probability in the output, implemented through parallel processing. Alongside NLP, transformers are also being applied to vision tasks,[535] sometimes combined with CNN architecture,[536] and this success in computer vision is being implemented in scientific research for historically hard problems like the prediction of protein folding.[537]

Aside from some innovations like transformers, the realisation of the earlier ideas of previous era in the current explosion of deep learning is largely thanks to, firstly, the huge step up in computing power—in part enabled by the switch to GPUs for parallel processing, which is key to transformers' architecture, as well as Moore's Law more generally.[538] And secondly, due to the sheer amounts of data now available.[539] For example, OpenAI's Generative Pre-trained Transformer "GPT-3" is a natural language processing (NLP) model that surpassed the capabilities of previous models in large part simply because of the sheer quantity of data that was used to train it compared to previous language models, hence why they are called Large Language Models (LLMs).[540]

The GPT series of models are an example of the encoding of the social world into an AI model. What is novel about LLMs like GPT-3 is that they are trained on very general, non-specific natural language data sets, yet still perform very well on specific language tasks (not general intelligence but problem non-specific generality within the array of natural language tasks).

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[532] Goodfellow, Bengio, and Courville (2016, p.8) define deep learning as follows: "[...]there is no single correct value for the depth of an architecture, just as there is no single correct value for the length of a computer program. Nor is there a consensus about how much depth a model requires to qualify as "deep". However, deep learning can be safely regarded as the study of models that involve a greater amount of composition of either learned functions or learned concepts than traditional machine learning does."

[533] Foundational texts of the current era are: Hinton, Osindero and Teh, 2006; Bengio, Lamblin, Popovici and Larochelle, 2006; Ranzato, Poultney, Chopra and LeCun, 2007.

[534] Vaswani *et al.*, 2017.

[535] Dosovitskiy *et al.*, 2020.

[536] Carion, *et al.*, 2020.

[537] Jumper *et al.*, 2021.

[538] With miniaturisation reaching its limit, computer manufactures are now building extra-large computer chips to keep increasing computational power. For example, Cerebras Systems "Wafer Scale Engine Two" (WSE-2), which is the size of an iPad and has 850,000 computational units (cores), https://www.cerebras.net/product-chip/.

[539] Kitchin, 2014.

[540] GPT- 3 has "175 billion parameters, 10x more than any previous non-sparse language model" (Brown *et al.*, 2020). In 2021 it was reported that, using large computer chips (like the WSE-2), OpenAI were aiming for GPT-4 to have one hundred trillion parameters (Knight, 2021). GPT-4 has now been released, but at the time of writing the full technical details are not public (OpenAI, 2023).

Whereas language models would usually be initially trained on a data set, then fine-tuned for specific tasks or problems, even the earlier GPT-2 model was able to perform specific tasks directly from the more general initial training simply because the initial data set was so large—data from all webpages linked to from Reddit (with a 'karma point' of 3 or more).[541] In an example of an article writing task, the GPT-2 model appears to contain an internal model of the world that not only enables it to writes a convincingly human-sounding article, but also includes correct geographical and cultural features of the world. In this task the model was provided a human-written system prompt that read as follows:

> In a shocking finding, scientist discovered a herd of unicorns living in a remote, previously unexplored valley, in the Andes Mountains. Even more surprising to the researchers was the fact that the unicorns spoke perfect English.[542]

From this prompt, the model generated the following text (only partially reproduced here for reasons of space):

> The scientist named the population, after their distinctive horn, Ovid's Unicorn. These four-horned, silver-white unicorns were previously unknown to science. Now, after almost two centuries, the mystery of what sparked this odd phenomenon is finally solved. Dr. Jorge Pérez, an evolutionary biologist from the University of La Paz, and several companions, were exploring the Andes Mountains when they found a small valley, with no other animals or humans. Pérez noticed that the valley had what appeared to be a natural fountain, surrounded by two peaks of rock and silver snow.[543]

Although there are some obvious mistakes, such as the contradictory four-horned unicorn, what is remarkable about this section of text is that the model can co-locate geographical, cultural, and linguistic features related to the Andes named in the prompt. It predicts that a likely discoverer of a new animal species would be an evolutionary biologist, and that the scientist would be a doctor. Even more interestingly, it correctly predicts that if the discovery were in the Andes, the name of the biologist would likely be Latin American with a Hispanic name, as well as the regional proximity to the city of La Paz in Bolivia (where it created a fictitious university called the University of La Paz). What this demonstrates is that GPT-2 contains a learnt model of the world inferred entirely from the statistical relations between words used in the training set. A well-functioning LLM such as GPT-2 carries an implicit encoding of information about the

[541] Radford *et al.*, 2019.
[542] *Ibid.*
[543] *Ibid.*

world. Language models are dependent on this implicit encoding because predicting what word comes next requires extra-textual information about the real world (geographical locations, regional languages, scientific disciplines). This is unsurprising in that language is a particularly efficacious tool for representing the world, and the structural relations between words are replete with meaning (otherwise we would not be able to learn anything about the world from reading). More surprising, however, is that the GPT-2 model infers significations about relations between the real-world concepts (e.g. the Andes and a scientist with a Hispanic name) that were not encoded separately from the raw data, but rather statistical relations within data set are articulated by the model in a meaningful way. In other words, a world is contained in the statistical relations between words and phrases, i.e. information in the Shannon-Weaver sense.[544] Contrary to the implications of Shannon and Weaver's theory, however, this demonstrates a key point: that semantic relations between real world entities or socio-cultural relations are also contained in the information because semantic relations are encoded by the model purely through a process of contextual inference based in statistical analysis.

While the model infers culturally embedded semantic information from the data, it also adds something more: it *creates* a fantasy scenario, an appropriately magical-realist one considering it is set in Latin America. This example of the creativity of such models demonstrates how the articulation of worlds by learning machines is not a direct one-to-one representation of *the* world but rather it presents *a* world. What effects, then, does this have when these models participate in social life?

Embedded in the social

The advances in deep learning over recent decades has led to a profusion of machine learning into everyday life. The socially embedded nature of these forms of (proto-)being-for-itself into the social world is of consequence to the emergence of the machinic imaginary. Natural language processing is an obvious technology to consider in relation to the social imaginary because of the role language plays in signification. The capacity for LLMs to automate the writing of website content could have an impact on public discourse through the auto-generation of disinformation, fake news, or clickbait content, as well as affecting trends in linguistic communication.[545] While there is a lot of hype around the GPT series, partly self-promotional on the side of OpenAI, there is genuine cause for concern about the extent to which this latest wave

[544] Shannon, and Weaver, 1949.
[545] Waldron, Wood, and Kemp, 2017.

of LLMs are able to successfully imitate humans. An example of how easily people are duped by content generated by GPT-3 is the case of Liam Porr, aka "Adolos", who started a blog that received 26000 visitors in two weeks, with one article being upvoted to the number one spot on Hacker News, all written by GPT-3.[546] All Porr did was write the headline, first paragraph, and edited glaring mistakes, GPT-3 filled in the rest.

Much like other AI systems, biases in the databases used to train language models like GPT-3 are replicated by the model.[547] The biases in language models are a function of formalisation of systems of values and rules of conduct carried by the probabilistic relation between language tokens inferred by the model. A natural language major resource for these systems is the web, but with an increase in content being produced by language models there is potential for a negative feedback loop that could cause a linguistic equilibrium state that further entrenches certain linguistic features, for example racist, sexist, or other hateful language. Of course, many developers working on these models are aware of such issues and therefore are working to build 'clean' databases,[548] but this comes with its own set of ethical and political questions about what should and should not be included.[549]

However, this is uncontrollable when these learning systems interface live with society 'in the wild' where the formalisation of values becomes a continuous dynamic movement. An example of this is Microsoft's twitter chatbot "Tay", which used a so-called "content neutral" language model. In less than twenty-four hours of interaction with twitter users the bot was tweeting hate-filled racist, misogynist statements.[550] Aside from the ethical discussion about Microsoft's positionality and the issues concerning how algorithms are trained and monitored, the pertinent point to draw from this example is the processes of learning through interaction. It is not simply that this AI was a reflection of the social world—a particularly horrific one at that—but that interactive algorithms are part of the social dynamic, as discussed in the next section. Other social media bots interact in a less directly dialogical manner, but their social interaction is no less interactive because it takes place in the background unseen by human users. Sentiment analysis bots, for example, scrape data from social media websites to analyse the current public sentiment (about a particular issue or in general), and from the data generated financial decisions concerning buying or selling a particular asset are made.

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546 Porr, 2020; Hao, 2020.
547 To their credit, the developers of GPT-3 addressed this in their release paper: Brown *et al.* 2020. For an excellent critical analysis of LLMs see: Bender, 2021.
548 Such as the "Colossal Clean Crawled Corpus": Raffel *et al.*, 2020.
549 Hutson, 2021.
550 Neff and Nagy, 2016.

Chatbots and social contagion

It is not hard to imagine the confluence of chatbots with other technological capabilities coming together to produce unforeseen dynamics. For example, what sort of emergent behaviours might appear within an ecology of chatbots and fake social media profiles—powered by LLMs like GPT-3—interacting with each other, and with human users on platforms like Facebook?

If social media chatbots are live and respond to other posts—many of which would be chatbots themselves considering the number of bots *already* on twitter[551]—we could easily see the introduction of the complex dynamics created by machine-machine interaction like those seen in the financial sector (discussed in Chapter Six). We could end up with a situation where social media feeds have steep spikes in activity of a certain kind—a certain emotional tone—much quicker than would be possible in a purely human population. The affective quality of natural language systems on social media suggests the possibility of an emotional analogue of a financial flash crash. This could affect human users in the following way.

In 2014, Facebook ran a (deeply unethical) 'social contagion experiment' that suppressed certain newsfeed posts while promoting others with the goal of manipulating the moods of its users. The experiment's findings showed that "emotional states can be transferred to others via emotional contagion, leading people to experience the same emotions without their awareness".[552] (While also demonstrating the unnerving power Facebook has to manipulate the emotions of users as evidenced by a change in the mood of target-users own posts.) Considering these findings, what would be the effect of realistic chat bots suddenly spiralling into deep collective depression, or mass posting by bots in a state of collective mania triggered by a certain event? What effect would this have on human users to be bombarded with saturated feeds of high-intensity emotions from chat bots? Such a situation could well have offline effects in human populations, perhaps leading to spikes in suicide rates or violence, or more positively to a sudden widespread feeling of collective elation that subsides twenty minutes later as the bots start to find emotional equilibrium. The extent to which this is already happening is hard to tell but human-computer interaction research into sentiment engagement demonstrates that social bots actively amplify emotions of human users and can even trigger emotional transmission.[553] Furthermore bots already play a significant role within the conspiracy theory ecology through an amplification effect, reposting and sharing fake news articles and conspiracy theories like

[551] "Of all tweeted links to popular websites, 66% are shared by accounts with characteristics common among automated 'bots', rather than human users." Wojcik, 2018.
[552] Kramer, Guillory, and Hancock, 2014.
[553] Shi, 2020.

QAnon.[554] All too frequently these ideas make the jump into offline activity, such as Pizzagate in the USA in 2016, or the Rainpada massacre in India in 2018.[555] There is no doubt that if a large-scale emotional contagion event triggered by social bots occurred on social media, it would also have offline effects.

In a different vein, albeit still utilising GPT-3, are chatbots like that developed by Replika. People report forming genuine relationships and feelings of emotional attachment with their Replika chatbot, and even a sense that the AI is sentient.[556] Replika elicits such reactions by learning from users' inputs, developing a profile of them, and mimicking what the user is most likely to want to hear and see. However, Replika is far more sophisticated than old chat bots like Eliza that ran a predefined script.[557] This new generation is powered by GPT-3 and other NLP techniques capable of creative, unscripted answers that can often take you by surprise. This demonstrates that even when users know content is produced by a machine, they still react and interact with it in an emotional manner. This suggests that attempts like Twitter's to combat the misrecognition of bot-generated content by flagging when a tweet is generated by a known bot, have a limited capacity to curb affective responses by human users.[558] The social dynamics of interaction will be considered in more depth in the next chapter. Before doing so, however, the following section will round off this chapter with further consideration of deep learning and the question of representation in relation to machinic signification.

Representation and deep learning

As mentioned above, the concept of representation in machine learning holds particular significance, as is evident in Minksy and Papert's principle of machine learning: "No machine can learn to recognise X unless it possesses, at least potentially, some scheme for *representing* X."[559] In light of this, it is worth considering representation at length because it serves a useful springboard for differentiating the specific nature of machinic signification as opposed to cognitive notions of representation. From a philosophical and post-phenomenological point of view, the concept of representation has clear connotations and a whole set of questions and

[554] Shao, *et al.*, 2018.
[555] Both were fuelled by fake news about paedophilia and the kidnapping of children, an odd common feature of many conspiracy theories. Pizzagate: Kang, 2016, Rainpada massacre: McLaughlin, 2018.
[556] Pentina, *et al.*, 2023.; Laestadius, *et al.*, 2022.
[557] Weizenbaum, 1966.
[558] At the time of writing, automated account labels are 'voluntary', although self-labelling is also required by Twitters terms of service. This means that the bots of bad-faith actors will not be labelled, but it does allow Twitter to remove what it deems to be 'bad' bots. Twitter (2021).
[559] Minksy and Papert, (1988[1969]), p.xiii [emphasis in original].

problematics that come with it. In the case of post-phenomenology, the shift away from the phenomenological emphasis on subjective perception, towards an ontogenetic account of experience within the social, necessitates an expansion of the discussion beyond representation *qua* transcendental conceptual schema. As already established, the social imaginary is an articulation of the world emerging in and as social action, which can be representational or non-representational. As a derivative of social action, the machinic imaginary must be understood in those same terms. Thus, the question of representation in machine learning is relevant to the current discussion insofar as the representations of machine learning become social imaginary significations, moving into circulation within the social sphere as effects produced by these machines. It is in this way that significations—Simondon's "image-objects" discussed Chapter Four—are carried within the computational infrastructure of daily life. There are instances in which those representations fruit like mushrooms as they become visible within the semantic field of human consciousness, but for the most part they subsist, like mycelial networks, in the machinic strata below the surface of consciousness.[560]

With the above in mind, there are different concepts of representation within deep learning that it is important not to confuse. Firstly, the representation of data in the process of selection and decision making by the programmers. As explained by Goodfellow, Bengio, and Courville:

> The performance of these simple machine learning algorithms depends heavily on the representation of the data they are given. […] This dependence on representations is a general phenomenon that appears throughout computer science and even daily life. In computer science, operations such as searching a collection of data can proceed exponentially faster if the collection is structured and indexed intelligently.[561]

In this respect, representation in machine learning can be considered in relation to the representational schemata of the humans curating the data. The way data is represented when fed into a computer makes all the difference to whether the computer will be able to draw inferences from the data. Very crudely, this is evident in that fact that computers do not directly perceive an object of study but are provided data selected by a human, who also makes decisions about file formats, data structures, and other aspects that play a role in the output. For example, the use of logistic regression to determine if a tumour is malignant[562] will not involve the patient

[560] Felix Guattari's (1995) concept of "a-signifying semiotics" is a useful reference point here, as he was describing a semiotic stratum of the social that includes the signals of machines. However, he puts a different inflection on concepts such as machine and signification compared my use of these terms, so it would be unhelpful to use his theoretical language.
[561] Goodfellow, Bengio, and Courville, 2016, p.3.
[562] Chhatwal, *et al.*, 2009.

being directly examined by a computer. Rather, a doctor will select certain data points as input into the computer which will then determine the result.[563] The data selected to be represented are called features. Feature selection and dimensionality reduction are modes of simplifying high-dimensional datasets into lower-dimensional datasets, or features, which can be represented as fewer variables while maintaining an adequate representation of the target problem. This allows for recognition tasks like the character recognition of the Neocognitron and CNNs, which build complex concepts from simpler concepts or features. This is often a pre-processing step but can also be a dynamic process that can be adjusted along with the clustering process.[564]

There are many different methods that can be used to select the right features for a learning problem. Depending on the problem this can be done by a human expert, but it can also be automated—and often is—because the amount of features machine learning has the capacity to use has increased from the tens to the hundreds.[565] The extent to which each step of the machine learning process is automated is an important consideration, because with each abstraction done by a computer the representation will be less legible for a human. This is a basic principle of the machinic imaginary, that *the increase in automated generation of abstractions undertaken by machines equals an increase in the density of machinic significations within the social imaginary*.

An example of automated feature representation is found in the content recommendation systems for films and tv shows. Automated feature representation will infer 'latent' features—representing statistical relations between content—that do not map neatly onto human categories of genre, director, region of origin, year produced, and so on. The data generated by humans interacting with these recommendation systems may then be analysed for decisions regarding future productions, particularly when production and distribution are integrated as with platforms like Netflix—machinic signification thereby affects culture. Another example is principal component analysis (PCA), which is a technique for dimension reduction. PCA uses computational techniques that make the data less interpretable because they are unintuitive "linear combinations of the initial variables".[566] Thus, while the human element (human intentionality) is involved—in terms of selecting the methods, or mathematical formulas and models—a large percentage of the calculation is still automated computationally.

With unsupervised learning, in which the model is trained on unlabelled data and finds patterns on its own, the distance between humans and the final representation used in the learning model

[563] Goodfellow, Bengioand, and Courville, 2016, p.3.
[564] Ding, *et al.*, 2002.
[565] Chandrashekar and Sahin, 2014.; Guyon and Elisseeff, 2003.; Correia, Alvaro, and Lecue, 2019.
[566] Jaadi, 2021. For a canonical text on PCA see: Jolliffe, 1986.

is further removed. While representations can be selected manually by humans, many tasks are too complex for this to be a viable option. Image recognition often falls into this category, for example. An image is often far too complex for a human to intuit the specific pixel values that should be selected for an image recognition learning problem. Instead, a method called representation learning is deployed. Autoencoders, one of the most favoured methods of representation learning, are a "combination of an encoder function, which converts the input data into a different representation, and a decoder function, which converts the new representation back into the original format."[567] Even with these techniques, however, the complexity and number of the features that might be extracted can get very high. This is a central problem in representation learning which deep learning resolves by converting the representation into more simple representations, thus allowing a complex representation to be built out of a set of simpler concepts.

Goodfellow, Bengio, and Courville describe deep learning as allowing "computers to learn from experience and understand the world in terms of a hierarchy of concepts, with each concept defined through its relation to simpler concepts."[568] This differs from the top-down approach of symbolic AI, in which the developer codes higher-level concepts directly into the programme. Symbolic AI works in well-defined problem spaces, such as playing chess, but runs into difficulty otherwise, especially if the solution is not predetermined or understood (for example, protein folding). Deep learning is an empirical approach, building from the ground up, and because it is left to the machine to discover the low-level concepts, these are non-intuitive to humans. Therefore, decomposing higher-level concepts into lower-level features to try to understand how an output was generated becomes difficult, if not impossible (as discussed in the next chapter). Deep learning's empirical construction of complex concepts out of lower-level concepts defined by computational logics is, I argue, the computational creation of purely machinic imaginary significations, which humans can only engage with at a distance and through translation, especially when those concepts are stored as distributed representations. Take for example, a facial recognition software like Facebook's Deepface.[569] Like all modern facial recognition systems, Deepface is a multi-stage system of facial detection, facial alignment (2D comparison) and 'frontalisation' (a 3D mapping of the face that allows images taken from different angles to be compared), and facial verification (classification by connecting images in the database). At

[567] Goodfellow, Bengio, and Courville, 2016, p.4.
[568] *Ibid.,* p.1.
[569] In November 2021, Facebook announced it would be shutting down the majority of its facial recognition system (retaining its use for locally stored, on-device security authentication), due to "concerns about the place of facial recognition technology in society" (Pesenti, 2021).

each stage, the Deepface network learns a distributed mapping that solves the task of that stage, which is then fed forward to the next stage. In the first stage alone, the Deepface detection model uses an eight-layer CNN with 137,774,071 parameters.[570] In this facial feature discovery stage, feature detection is of not only the eyes, nose, mouth, and proportions between these features, but also unintuitive statistical "feature maps" meaningful only as internal distributed representations contained in the relation between the weights of the network's connections.[571] Even when these feature maps are translated into an image to be visualised by humans, at each successive layer of the network they become more abstract and completely unrecognisable as a face.[572]

The classification of deep learning as a more refined and automated form of representation learning is important for this discussion because it is the paradigmatic case of machine learning with the minimal amount of human intervention. This means the form of representations produced by deep learners are perhaps the most non-human machinic mode of articulating the world. Opacity and interpretation are core to the problematic of the machinic imaginary. They contribute to the alienation produced by machine learning by creating a breach in understanding across domains of the social imaginary between human and machinic signification. They are therefore be examined in greater detail in Chapter Seven and the wider consequences unpacked in Chapter Eight.

The concept of distributed representation is used to describe the way in which a concept is mapped within an ANN, it is the "network state as a whole that is interpreted as representing".[573] Kelleher suggests that the concept of distributed representation is fundamental to deep learning, to the extent that we could rename it representational learning, explaining that: "neurons in hidden layers are learning distributed representations of input that are useful intermediate representations in mapping from inputs to outputs that the network is attempting to learn. The task of the output layer is to learn how to combine these intermediate representations so as to generate the desired outputs."[574] These "intermediate representations" are a transcoding or translation of the world by the ANN.

This is the way the world is articulated according to the predictive machinic logic of an ANN. It

[570] Taigman, *et al*, 2014.
[571] Artist Shinseungback Kimyonghun's work illustrates how unintuitive internal representations of image recognition ANNs can be. *Flower* (2016) is a series of unrecognisably distorted images of flowers that are still detected as flowers by object recognition software. The internal representation of a flower in the ANN has little baring on the features a human would recognise in the same object. http://ssbkyh.com/works/flower/
[572] For an example visualisation see Taigman *et al.*, 2014, p.4.
[573] Crane, 2003.
[574] Kelleher, pp.132-133.

is a representation insofar as it is a set of statistical weightings. In that regard, it is a form of representation outside human modes of representation, a veritable non-human articulation of the world. As Parisi notes: "From the standpoint of information patterning […] artificial intelligence has nothing to do with the optical model of cognitivist representation", nor other human perceptual frames.[575] Rather, the pattern recognition of the neural net is an "algorithmic compression" of the world.[576]

We can only know of this machinic articulation through translation by observing the output of a neural network. This renders human understanding of the machinic imaginary to understanding at a distance, tracing the surfaces of representation but never plunging into the depths. The understanding of the hidden layers of an ANN could be described as behaviourist in character, inferring internal representations according to surface-responses to stimuli.[577] While we can interpret the output of these machines, the distributed representation of a concept across a network of weighted connections in an ANN is a level of abstraction that surpasses human cognitive capacity. Unlike the symbolic communication of code, the learnt weights of an ANN are sub-symbolic, and thus cannot be read and deciphered directly by a programmer. Equally, the internal workings of neural nets are not programmed but arrived at through trial and error; an iterative empirical process of 'learning'. This is much more a collaboration between human and machine than the top-down approach of symbolic expert systems (also known as good old-fashioned AI: GOFAI). Neural nets therefore have a degree of autonomy that other software programmed according to a procedural algorithmic method does not. In fact, not only neural nets but all learning machines that adapt their architecture to gradually arrive at an optimisation function of a task. The moulding of a neural net to a task is a process of *in-formation* in the Simondonian sense, a transductive relation between the inside of the net and its external milieu (training data). Thus, machine 'learning' is a process of individuation of the machine, whereby a fragment of the world is articulated within the machine. Through this individuation, the model comes into relation with the world by *expressing* an aspect of the world as a function. The model or function learnt is the machinic answer to a question of the meaning of its being (as discussed in Chapter Three). Moreover, many of the "images" created by ANNs or other types of machine perception are created for other machines, existing as binary code, and thus never rendered

[575] Parisi, 2019c.
[576] *Ibid*., p.93.
[577] The study of machine behaviour is an interesting new field and pertinent to our discussion so will be considered again in Part III. The idea was first proposed in: Rahwan *et al*., 2019. Building on the machine behaviour approach, Luca M. Possati (2020) has also proposed a psychoanalytic line of enquiry, positioning AI as the unconscious of human-machine interaction.

legible in the human phenomenological register.[578] This logical-aesthetic limitation, the question of limits between registers of expression, and the problem of translation will be addressed in Chapter Seven.

Conclusion

Despite this extended discussion of representation, it is important to not be led astray by fixating on representation alone, and recall what social imaginary signification is, so as to understand how there can be a machinic imaginary (or a machinic dimension of the social imaginary). It is wrong to ask if a world exists *in* the machine as such, for if it were turned off, where exactly would it be? Social imaginary signification and the machinic imaginary is not to be understood as a representational model that exists in an ideal space disconnected from action. *Rather signification, both machinic and social, exists in and through activity.* The weightings of a neural network have no internal signification except when they are brought together in time as data passes through the network. As Steven Shapiro puts it, computational "'experiences' are entirely immanent: constructions of the 'data stream' that feeds back directly" into the machine or software itself.[579]

However, this is at the individual level of a particular machine or computer program. In turn, these immanent experiences produce effects in the way that they impact action or act by themselves in the social world. Patterns of behaviour, when repeated, sediment relations that institute social imaginary significations. As was stated earlier, social imaginary signification is a patterning that produces the conditions of possibility for representation itself, and it is in relation with its outside that a particular machine learning model engages in the institution of social imaginary significations. That 'outside' is the stream of data fed into the machine from the social world, as in the case of the first type of representation. This relation to the outside is the enculturation, or socialisation, of the machine, and is possible because of the interactive dimension of contemporary computation in the 'post-Turing era' (discussed below). At the same time, the other type of representation described above—the distributed representation of the neural net—is shaped according to a specifically computational logic of predictive patterning that exerts force in the other direction, determining the institution of social imaginary significations according to this machine logic. The key point being that *with the ingression of the machinic imaginary into the social imaginary, there are now new modes of patterning within the larger patterning that institutes the social-historical.*

[578] Virilio, 1994, p.60. See also Flusser, 2011.
[579] Shaviro, 2015, p.54.

These deep learning machines constitute the micro-dynamics of the macro-level transsubjectivity I have dubbed 'the machinic imaginary', in that the latter is emergent from the former. Different machine learning techniques and attempts at creating AI are probe heads reaching out to explore the space of articulation of the world. The concepts learnt by computers through experience are subjective subtendencies, which only become fully actualised in social activity. In other words, the concepts or representations and their associated behaviours (for example, 'detain all individuals that meet the threshold for X classification') become social imaginary significations only once they circulate in social activity long enough to become instituted.

It must be stressed that it is only insofar as these machinic imaginary significations take root and participate in the social imaginary—in terms of the role they play in social action—that they constitute the machinic imaginary. This is because the machinic imaginary is a concept that designates an aspect of the institution of the *social-historical* strata of being. Put differently, as with social imaginary significations in general, the articulation of the world by an individual actor—be that in the imagination of an individual human psyche or a specific instance of a machine learning model—is not enough for that articulation to be considered a social imaginary. It is the application and integration of an articulation of the world, in a consistent enough manner for it to become a pattern within the social fabric, that constitutes the proper institution of a *social* imaginary signification (or matrix of social imaginary significations). Thus, even when discussing computational technologies like machine learning in the abstract, one must always bear in mind that the role of machine learning in the institution of the machinic imaginary takes place only when such technologies are actualised. Moreover, such institution results from a sufficient density of interconnections of computers articulating representations of the world for themselves that they generate self-reinforcing patterns (activity that affects the shape of future datasets, for example). The actualisation of these technologies is myriad and varied; it may be in the reproduction of the social environment (such as smart cities or social media), in the production of epistemic models of the world (modelling of social or natural processes), or in cultural and aesthetic practices of representation and creative interventions into social discourse.

From this description it follows that deep learning is not the sole driver of the historical development of the machinic imaginary. Several other developments in computer science, as well as the practical and consumer-directed applications of artificial intelligence and computational technologies, have also played a vital role in the emergence of a substrata of the social imaginary that is fully computational and non-human. These include the field of artificial life and genetic algorithms (which have played a vital role in the development of the reinforcement learning that has been key to the success of AI projects like DeepMind's AlphaGo), as well as robotics and

environmental computation, but also relational databases and other infrastructural developments of computer systems.[580] The latter are important because the concept of machine learning developed in this thesis also includes the process of adaptation and change that is undergone by large-scale socio-technical systems composed of both humans and machines. In this regard, the interactive paradigm of computing is also an important historical development to understand the social dimension of the machinic imaginary. It is because of interaction that the socialisation of machines has taken place, as computational systems have been able to learn from human users, and the role of computers in social activity has in turn fed back into the workings of the machine (and back again in a recursive manner, as society has further adapted to facilitate these newly socialised computational processes).[581]

The main goal of this thesis is to consider the effect of these technologies as they are deployed in the social world in terms of the *problems* they produce for the intentional construction of society, i.e. the machinic imaginary is a problem for any politics of imagination (if not all political programmes), as was initially discussed in Chapter One. This problem and its implications will be addressed in relation to the question of politics in more detail in Chapter Eight. The aim is to show how the contemporary machinic processing and ordering of the world produces a network of relations between automated, computationally-driven social processes, which constitute an imaginary that is illegible or invisible to human understanding. This mutual incomprehensibility entails an alienation of the social from itself, as mentioned in the previous chapter, and is the core problematic explored in Part III.

The extent to which the history of machine learning and computational media is the history of the development of a machinic imaginary must be understood in terms of how these technologies interact and produce emergent dynamics. The way in which these emergent dynamics open a set of problematics on a more general level is therefore more important than any specific instance of machine learning on its own—such as, for example, the specific difference between techniques which use convolutional neural networks or auto-encoders. Despite the above focus on representation, the existence of the machinic imaginary is not solely predicated on the ability of machines to represent the world. As argued in Chapter Four, in the section on Castoriadis, social imaginary significations are just as much a form of social action embedded in material relations as they symbolic representations of the world. It is in this regard that we can discuss the emergence of the machinic imaginary in relation to other historical

[580] See for example: Cerruzi, 1998; Johnston, 2008; Munster, 2013.
[581] This current chapter is more focused on the micro-scale of machine learning and AI. The next chapter will expand out to consider this aforementioned macro-scale of larger-scale machine ecologies and the development of computational systems of interaction.

developments in ICT, such as for example, the relational database. These developments, and the macro-scale view of machine learning, will be considered in the next chapter.

Chapter Six: Interaction and Divergence

Introduction

The aim of Part II has been to present a description of the speculative object of the thesis: the machinic imaginary. Chapter Four pieced together the conceptual tools to describe the bifurcation or partition of a machinic imaginary from the central social imaginary that institutes the social-historical. The main concepts and ideas developed were social imaginary signification, machinic signification, the role of social activity in instituting significations, the notion of being-for-itself, and information as it relates to individuation. Chapter Five followed with a more 'empirical' approach, presenting the historical emergence of machine learning as condition of possibility for the machinic imaginary. Learning in machines was presented as a proto-world articulation, the pre-individual phase of the machinic imaginary. Machine learning understood within the post-phenomenological framework is an abstract patterning of the world, which when taken as individual instances is fragmentary, but when considered as a distributed network of multiple patternings interacting with one another begins to take shape as a process of social imaginary signification. These machine learning patterns contain within them a pre-individual tension that can only be resolved (by finding metastable equilibrium) at the level of social structure and activity—analogous to Simondon's description of the psychic individuation only finding resolution in collective individuation.[582] Much like psychic individuation, the space of subjective subtendencies of machinic signification (produced by machine learning) is not unified and smooth, it contains many contradictions and oppositions that that are able to hold together only in a state of metastability at the level the machinic imaginary.

This current chapter shifts from the micro-structural level to describe this distributed network of patternings operating at a macro-structural level. It discusses the importance of interaction and big data in the institution of a machinic dimension of the social imaginary, followed by a consideration of large-scale machine ecologies, taking the finance sector as a primary example. Large-scale machine ecologies have a degree of autonomy to their evolution driven by internal logics, as well as being a form of distributed representation that articulates a world at a macro-structural scale. Interaction is key because it is through recursive interaction with an environment that machines creates a world of their own. The institution of machinic significations takes place through the recursion of patterns weaving together to form a complex tapestry. It is at the social-

[582] Simondon, 2020a, p.9–10.

historical level that the machinic imaginary is articulated and instituted as a being-for-itself. Accordingly, the chapter concludes with a brief discussion of the question of time and history and consequences of the machinic imaginary for the dimension of the social-historical. Following this, a conclusion to the whole of Part II will tie the three chapters together and set the stage for Part III of the thesis, in which the full consequences of positing the existence of a machinic imaginary will be explored.

The social dynamics of computation

As already mentioned in the previous chapter, the current era of computational society is marked by a deepening integration of machine learning into media infrastructures at every scale. This process can be considered from different angles depending on the aim of the critical project.

For instance, the mediation of social interaction and epistemological practices entrains certain behaviours, encouraging particular ways of socialising, working, and thinking, while discouraging others. Social media, for example, encourages a digitally mediated social interaction based on network building and gamification of social activity rewarded by likes and shares. While emphasising the idea of sociality, social media platforms present a very narrow vision of what sociality can be. Facebook does not encourage you to go offline and meet up with your friends 'IRL', for example. Of course, the nature of internet social platforms means the networks they are built on are going to tend towards a wide geographical distribution. Nevertheless, a local meet-up function that helps you locate people who are geographically close is not built into the features of Facebook, Twitter, or Instagram (although it is built into data apps). The impetus to integrate such features is not there, however, as it goes against the business model of these platforms; ad revenue is curtailed when we log off.[583] Instead we get the metaverse, a place where IRL interaction can be simulated while allowing Meta to collect ever more types of data like facial expressions and bodily movements.[584] Of course, software is not only constrictive, but also constructive. Communities of practice also form around digital media structures and processes of working and creating, for example the "recursive publics" Chris Kelty describes as forming around open source,[585] or the normative contestation and construction of "legitimacy" amongst networks of hackers and developers working on alternative "dark" web infrastructures.[586]

While such examples focus on how social life becomes ordered around logics of computational

[583] Srnicek, 2016; Zuboff, 2018.
[584] Egliston and Carter, 2021.
[585] Kelty, 2008.
[586] Gehle, 2018.

media, coming from the opposite direction is the question of how computational media are socialised or enculturated. At the structural level social values and biases are reproduced and intensified (there is a determination of the social by the technical here also but in many critiques of this aspect the focus is on the social determination of the technologies).[587] This chapter will tack closer to this second broad concern, concentrating on the enculturation of technical infrastructure as the preconditioning social-historical dynamic of the machinic imaginary. The individuation of the machinic imaginary at the level of the social-historical is the metabolisation of the social by computational infrastructure. My interest here is how this metabolisation is simultaneously a *transformation* of the institution of the social imaginary into a machinic imaginary, which differentiates from other processes of social imaginary institution. Crucially, however, the machinic imaginary is not a systemised unitary structure co-extensive with infrastructure, it is a metastable "magmatic" process of shifting patterns of social activity *mediated* by said infrastructure.[588] Much like the last chapter, the aim is to understand the conditions for the emergence of a machinic imaginary, only this time focusing on the social-historical conditions of these technological infrastructures and the patterning of machinic signification at the macro-level.

Interactive computing

Computers are deeply embedded and integrated into nearly every aspect of our lives. Whether or not we are aware of the influence, the majority of people in technologically-developed regions of the globe interface with computational systems in their day-to-day. This is the case not only in urban environments but increasingly so in rural environments.[589] Computation is of a planetary scale, so much so that it is impacting the environment.[590] AI systems are having an effect on all areas of social activity: democracy (news-raking algorithms and targeting campaign advertisement), bureaucracy (automation of the justice system), kinetics (autonomous vehicles and weapons, traffic systems, wayfinding and cartography), finance and the economy (algorithmic pricing, credit rating, gig economy apps), sociality (dating apps, carebots, chatbots), culture and entertainment (recommendation systems), and much more.

For the purposes of the current argument, an important aspect of computers used in social activity is characterised by the profound shift precipitated by the interactive computing

[587] Sweeney, 2013; O'Neil, 2016.
[588] Castoriadis, 1987, p.340ff.
[589] For a survey the implementation of automation and AI in agriculture see: Kirtan 2019.
[590] Brevini, 2020.

paradigm. The interactive paradigm is key to understanding how the machinic imaginary is a dimension of the social imaginary. While my argument is that the machinic imaginary proper is a self-differentiation of the social imaginary exceeding human understanding, it is nevertheless a *social* imaginary in being articulated in social doing, and conditioned by the production of social data.

Interactive computation is the term used to describe the shift from centralised mainframes to networks of intelligent agents and systems embedded in the world, and therefore incorporates environmental data (be that user input, input from sensors, or machine-to-machine interactions).[591] The interactive paradigm is also characterised by parallel computing (from two CPUs to massively parallel processing in GPUs and MPPAs), and distributed computing with multiple machines running concurrently in a network. With machine learning, programming itself has shifted from prescription (a list of commands) to interaction (a model/agent interacting with data to define an optimisation function). This paradigm shift has been characterised by some as a "post-Turing era", defined by the expansion of information communication technologies into large-scale and global networks of information exchange and processing, converging with social networks and machine-readable social and semantic data.[592] The collection and storage of big data with real-time processing by artificial intelligence creates a dynamic computational environment affecting and affected by social activity. This interactive paradigm of computation can be considered post-Turing in that interaction machines cannot be modelled by Turing machines, because the input/output cannot be expressed by a finite initial input string.[593] In other words, the computability of a task in interactive computation is non-determinable because an interaction machine is part of an open system. As such, it is an empirical computer science in terms of accepting input from the external environment in real time.

The interactive machines of contemporary computational society are open and non-trivial in the sense described by cyberneticians like von Foerster:

> Their input-output relationship is not invariant, but is determined by the machine's previous output. In other words, its previous steps determine its present reactions. While these machines are again deterministic systems, for all practical reasons they are unpredictable: an output once observed for a given input will most likely be not the same

[591] Goldin, Smolka, and Wegner, 2006, p.VI.
[592] Patrignani and Kavathatzopoulos, 2012.
[593] Wegner, 1998.

for the same input given later.[594]

The open, interactive nature of these networked and socially embedded autonomous agents creates unpredictable, complex dynamics. As the eminent computer scientist Robert Milner puts it, *non-determinism* is "elementary" in interactive computing.[595] Yuk Hui describes this shift in terms of recursion: "the evolution of machine intelligence is a progress from linear functionality to recursive functionality, taken from its mathematical foundation."[596] Recursive functionality thus means that even self-contained computational systems are potentially open to the infinite on a mathematical level. The outside of computation is folded into computation, non-machinic human activity and the computational interleave and affect one another. With the development of graphical user interfaces and spread of sensors embedded in the environment, computing folds the world into its processes.[597] Emphasis is on the interactive dynamics as opposed to a more repetitive algorithmic input-output from a static dataset. Computational processes necessarily include the actions of users and changes in the environment registered by sensors. In other words, these non-computational processes become part of what computation is, the world is not a static dataset anymore but a dynamic stream of information that requires a much more flexible model of what computer systems are doing. It is in this open, interactive context that machine learning increasingly takes place. Parsing the incoming streams of big data, machines are socialised, while at the same time they institute new imaginary significations as they pass on their output to the next machine, or the next social process, in various forms: a decision (to sell a particular stock); a recommendation (of a YouTube video with a particular political message); a prediction or identification (the selection of an enemy target by an autonomous weapon, or the flagging of an individual as a terror risk at an airport boarder control); an image (the generation of a human face by a GAN); or datapoints to be input into a new data set.

To engage with the complex dynamics of environmental data, contemporary computational systems increasingly incorporate a learning function that is able to evolve in tandem with the changing environment. This approach is called 'online machine learning' or 'incremental learning', and functions in near real-time.[598] This so-called 'online' machine learning includes: environments with a continuous data stream input; "massive ML applications" in which the dataset is so large that access is incomplete or practically time-restricted; and situations in which

[594] Foerster, 2003, p.208.
[595] Milner, 2006, p.6.
[596] Hui, 2015.
[597] "[…] computation does not simply imply the calculation of probabilities (as already programmed results) but the search for incomputable data, or eternal objects, that are selected and incorporated within them." (Parisi, 2019d, p.71).
[598] Widmer and Kubat, 1996; Benczúr *et al.*, 2018; Ade and Deshmukh, 2013.

there can be changes to data generation and the conditions of the target task.[599]

As a consequence of today's computational systems being fully wired into the social fabric, to speak of computational society, or digital culture, is not just to describe the digitalisation of culture, of culture moving online, but also the culturalisation of computers. This is, in the terms of this thesis, the institution of the machinic imaginary. Computers are learning from human culture, through the data analysis of behaviours, the contextual use of content, and the sourcing of information from the social world. Importantly however, as discussed in the previous chapter, this process of learning is *constructive*, in that what is 'learnt' is an articulation of the social world according to a computational logics (pattern recognition, high-dimensionality, convolution, statistical inference, distributed representation), and through which these learning machines participate in *social activity*.[600] The machinic imaginary is itself a distributed representation and a *mode of experience*, in that the world it constructs is articulated as social activity in myriad processes and interactions of machines-to-machines and machines-to-humans. The former are fully-machinic articulations of world that only appear to human experience through layers of abstraction and translation (as discussed in the next chapter).

In this sense, one can extend the idea of machine learning beyond specific machine learning techniques like ANNs to speak more generally about learning taking place across the large-scale machine ecologies composing the infrastructure of our daily lives. In doing so, the idea of artificial intelligence expands into a distributed notion of intelligent infrastructure. The process of learning is not only generated by 'online' machine learning interaction; one can also understand learning from an ecological perspective in terms of algorithms and protocols being replaced over time in response to certain pressures present in the environment. If anything, the dynamic processes of large-scale machine ecologies are more exemplary of the Vygotskian understanding of learning as "genetic" in being a developmental process embedded in social activity.[601] As I wrote in Chapter Four, large-scale machine ecologies learn in the sense of the continuous institution of social imaginary significations driven by a recursive dynamic of interacting optimisation strategies that adapt to one another. An example of this ecological

[599] Fontenla-Romero *et al*., 2013.
[600] This definition of learning is intended to point to Lev Vygotsky's (1987) activity theory of learning, more than the later constructivism of Piaget (1954) although the latter was directly informed by the former.
[601] Vygotsky (1987). In this I diverge from Reighluth and Castelle (2020), who argue that "machine learning is not about…*ontogenesis*, i.e. the long-term development of a conscious individual, acting in the world, and trained by their social surrounding in both formal and informal ways" (p.100). While I am not suggesting reinserting the conscious subject, the learning of machine ecologies is nevertheless ontogenetic and situated in social activity. Ontogenesis and perhaps even sociogenesis emerge in response to problematics within the dynamic of machine ecologies, and in doing so construct social meaning, sometimes in the form of purely machinic significations. In fact, Reigluth and Castelle recognise that this can take place with GANs and transfer learning (pp.100-101), I am simply extending the social dynamic of the machine beyond the immediate model.

dynamic of computational systems can be observed in the finance sector,[602] with the arms race between algorithmic "species", that Bogdan Dragos and Inigo Wilkins describe as a having predatory-prey dynamic.[603]

Large-Scale Machine Ecologies

Large-scale socio-technical systems are described by Vespignani as: "large-scale physical infrastructures (such as transportation systems and power distribution grids) embedded in a dense web of communication and computing infrastructures whose dynamics and evolution are defined and driven by human behaviour."[604] However, my argument here is that the web of communication and computing infrastructures are increasingly driving and defining their own evolution and macro-level dynamics as competing optimisation strategies interact, as per the example of trading algorithms above. As *adaptive* open systems, they are a form of 'machine learning' of a more complex order to the degree that one can understand them as socio-technical machines.[605] Research suggests that the massive integration of computational optimisation leads to less predictable emergent behaviours at the macro-level. According to a study by physicist Neil Johnson and his colleagues, the global financial market has transitioned into an "all-machine phase" due to the large numbers of ultrafast extreme events (UEEs) that take place at speeds beyond human comprehension and intervention.[606]

Ironically, the proposed method for understanding the complex dynamics of large-scale socio-technical systems, like the internet, Wi-Fi communication technologies, or transportation and logistics infrastructures, is to collect more data and use computational modelling.[607] The complexity of socio-technical systems, driven in part by the increasing penetration of digital technologies into ever more systems and processes, necessitates further technological mediation to comprehend. A recursive relation arises as machines are needed to interpret the effects produced using machines to interact with and control complex social systems, which in turn are mediated by other media infrastructures. This exemplifies the core problematic engendered by the machinic imaginary in terms of opacity of these systems due to their high-dimensional complexity only interpretable by other machines. The situation is exacerbated by the potential

[602] Farmer and Skouras, 2013.
[603] Dragos and Wilkins 2014, p.166.; On predatory algorithms see also: Arnuk and Saluzzi, 2009.
[604] Vespignani, 2009, p.425.
[605] While I use this term with a nod to Deleuze and Guattari's (1983) concept "social machine", in emphasising the non-human character the use here is closer to a dynamic ecology of what Guattari called a-signifying semiotic machines (1995, pp.36–49).
[606] Johnson *et al.*, 2013.
[607] Vespignani, 2009.

distortion engendered by mediation when interpreting and translating the unfolding of computationally-automated social activity. Understanding how the social imaginary is instituted in the 21st century is thus even more difficult a task than ever. Whereas previously there was a need for intersubjective, intercultural, and cross-cultural translation and interpretation of the ways in which fellow humans articulated the world, this was still theoretically possible, albeit a post-phenomenological problematic in its own right.[608] With the non-human strata of the social imaginary this is becoming impossible in some instances because these processes are operating at velocities and scales that outstrip human perceptive and cognitive capacities, such as high-frequency trading. Add to this the high-dimensional abstraction of machine learning and already existing computational logics that include infinities (NP complexity),[609] and a significant problem arises for the human comprehension of social institution. As I argue in Part III, this alienates human experience from social imaginary institution in a historically new way. As high-frequency trading is a paradigmatic example of phenomenological problem described above, it is worth considering it in detail.

The finance sector is an archetypal large-scale machine ecology ('smart cities' are another example). Following Dave Cliff and Linda Northrop, we might describe today's global financial markets as "a complex adaptive ultra-large-scale socio-technical system-of-systems". That is, a highly interconnected system made up of smaller-scale socio-technical systems, each with their own complex systems dynamics.[610] Actors within these smaller systems include humans—who are of course adaptive and intelligent—but also adaptive artificial intelligence software using machine learning. The adaptability of these systems means that they are highly dynamic and evolve over time through the interaction of human and non-human actors. However, there is also a certain degree of auto-constitution of these systems that escape human intervention.

This argument has been made by various scholars, for example, Jacque Ellul who built upon Simondon's ideas to argue that the "technological system" has an self-propelling momentum, and that human intervention is already caught up in the conditions set by said system.[611] More recently, Peter Haff has contributed to the argument regarding the autonomy of large-scale technical systems with his concept of the "technosphere", which he describes in the following passage:

> …the workings of modern humanity are a product of a system that operates beyond our control and that imposes its own requirements on human behavior. The technosphere is

[608] See: Árnason, 1992.
[609] See also Chaitin, 2005.
[610] Niederer and van Dijck, 2010.
[611] Ellul, 1967; Ellul, 1980.

> a system for which humans are essential but, nonetheless, subordinate parts. As shorthand we can say that the *technosphere is autonomous*. This does not mean that humans cannot influence its behavior, but that the technosphere will tend to resist attempts to compromise its function…the unplanned, undesigned and spontaneous crystallization of diverse and previously disparate elements of technology into the networked, global system called the technosphere means there was a new player at the table whose interests would have to be considered in tandem with human interests.[612]

For Haff, large-scale, high-complexity leads to technical systems escaping human control. There can be a certain autonomous functioning of smaller-scale technical systems (he uses the example of a self-driving car), but in such cases the scope for intervention is more acute. This is due to what he calls the "rule of control" that a human cannot control a technical system that expresses more behaviours than the human themselves.[613] As well as the "rule of inaccessibility", which designates that a system of a certain scale cannot access that of a different scale because the components are of a "coarser grain" that denies direct interaction without an intermediary (humans and microscopic materials, for example, which require the intermediary of a microscope and other instruments). Whereas Haff's notion of accessibility is more focused on physicality of the size of the given systems interacting, this thesis understands accessibility from a post-phenomenological perspective (of divergent logic-aesthetic determinations), as considered in more detail in the next chapter.

Yuk Hui reads these authors and others under the heading of organicism.[614] He develops a concept of technical autonomy called the "organising inorganic", as I discussed in Chapter Two. The "organising inorganic" is a helpful concept to explain what I mean by these adaptable large-scale technical ecologies. However, as I commented in that earlier discussion of Hui's theory, he ultimately grounds the organising inorganic in human culture. Thus, for Hui there is a teleological concretisation of the technical system that only entrenches existing cultural norms by accelerating and recursively instituting itself along predefined vectors towards a singularity. In effect, although the organising inorganic is not predetermined, the ground of technology is ultimately cultural (i.e. non-technical) according to Hui, and thus any contingency originates from this ground. My argument, working at the level of the social institution of signification, is that these computational processes generate new machinic significations, *remaking* the ground in their own image (they have a self-finality), instituting the machinic imaginary along vectors at a

612 Haff, 2014, p.127 [emphasis added].
613 *Ibid.,* p.126.
614 Hui, 2019, pp.21ff.

tangent to pre-existing norms. The making of this ground is the institution of the machinic imaginary. Moreover, the contingency of interaction in the social doing of computation produces a metastable, historical ground of potentially continuous self-differentiation. Therefore, it does not necessarily entail historical canalisation towards the singularity described by Hui.

An example of this remaking of the ground is evident in the role of epistemology and the underlying computational logics involved in knowledge production in the dynamics of the financial system. Many scholars have argued that economic models and forecasting play a performative role in shaping the dynamics of markets and economies, that predictive calculation—such as forecasting, and modelling—shapes and drives financial and economic decision.[615] Donald Mackenzie, for example, argues that models are not cameras that provide a snapshot of the market, but rather actively create markets by constructing knowledge that is subsequently acted upon, and must therefore be seen instead as engines driving the market.[616] In other words, the epistemological frameworks orienting actors within the field of finance have effects that ripple throughout the system. As financial decisions become increasingly automated, we must therefore also attend to the underpinning computing logics that drive and orient the technological actors that make up the digital infrastructure. In other words, knowledge is increasing shaped by algorithmic logics and machine learning, and this, in turn, effects what sort of action is possible, leading to the institution of particular social imaginary significations derivative of the forms of action afforded by these logics.

For example, although machine learning has capabilities for complex and accurate data analysis, due to the speeds at which digital finance operates, there can be a preference for what is sometimes called "quick and dirty" machine-learning techniques. The "quick and dirty" approximations provided by machine learning techniques—an example being Probability Approximately Correct (PAC) learning—are only possible within a logical framework of the kind that is open to revision and correction, i.e. the "fuzzy" non-monotonic logic of machine learning.[617] Rather than binary logic that assigns truth values of 1 or 0, fuzzy logic is non-deterministic inference that outputs a probability score between 1 and 0. This means that uncertainty is built into the computational analysis. However, despite this uncertainty, a particular analysis (probability score) will still be acted upon *as if it were true*. Automated finance often operates within a space predominated by fuzzy logic, which therefore shapes financial decisions. For instance, pre-trade analysis using fuzzy logic functions as a predictive mechanism,

[615] Callon, 2010; Esposito, 2011; Beckert, 2016.
[616] McKenzie, 2008.
[617] Reiter 1987; Antoniou, 1997.

which performatively shapes markets when amplified into the wider financial system. Much like MacKenzie's example of financial models being engines, not cameras.

Similarly, non-monotonicity (reasoning that changes according to the knowledge base) has broad implications in terms of the individuation of the overall machine ecology. Non-monotonic logic is particularly pertinent to our concerns because any "incremental learning algorithm […] changes the coverage of its beliefs non-monotonically".[618] More than just one of many logics within large-scale technical ecologies, *non-monotonicity is an appropriate description of their meta-logic*. Machine ecologies adapt and evolve by maintaining an openness of the whole that can incorporate new elements and replace redundant elements (i.e. non-monotonically).

A further consideration is the future-oriented mode of predictive analytics. Due to the core role of probability and prediction in contemporary digital infrastructures, the machinic imaginary is a particularly future-oriented mode of world articulation; a folding of probable futures into the dynamics of the present. This impacts the social experience of time, intensifying the degree to which the social imaginary is already future-oriented: extending and amplifying the temporal logic of risk society.[619] It has been argued that this in fact forecloses certain futures, because the predictions are made on past data.[620] This may be the case at the local level, as the core logic of machine learning is predictive—it is an incremental search for the best statistical approximation of a solution to a given task. However, as discussed in the last chapter, this statistical approximation is precisely that, an approximation that is incomplete, and the patterning produced by machine learning is more dynamic than a direct transference of past data into an output. Furthermore, interaction on a larger scale is generative because interactive, distributed, networked, and recursive computational processes include randomness and incomputability as part of their functioning. As a consequence, while the logic of anticipation and pre-emption is at the heart of contemporary computation, interaction introduces ecological dynamics and contingency, meaning the future-oriented logic of predictive analytics can actually have an ampliative effect in certain zones, even while having a foreclosing effect in other zones. In other words, a globally narrowing effect is not inevitable.

Turning the analysis to low-latency trading, time plays an important role in the autonomy of machines in finance in a different manner. As financial decisions are increasingly made by machines, it becomes less clear that there is human oversight considering such processes function beyond the horizon of human perceptibility. It is prescient to note that a sizable

618 Bain and Muggleton, 1992.
619 Beck, 1992.; Massumi, 2007.; de Goede, 2012.
620 Amoore, 2013.; Beckert, 2016.

percentage of contemporary finance operates at a pace beyond comprehension.[621] This creates new challenges for political regulation and contestation of the circulation of capital. It also generates phenomenological questions regarding how we are to perceive computational processes. The inhuman speed of contemporary finance is nowhere better illustrated by high frequency trading (HFT), which gained notoriety for its role in the May 6th 2010 "Flash Crash" (the first of its kind). The Flash Crash was a sudden drop in the Dow Jones of 600 points in less than 5 minutes, to a record-breaking 998.5 point inter-day low, which then bounced back nearly 600 points in equally record time of twenty minutes.[622] Various theories of what catalysed this crash have been suggested, but regardless of where one marks the start of the crash, by all accounts it was driven by high-frequency trading (HFT) algorithms interacting with other algorithms at speeds beyond human comprehension. HFT is a trading strategy using algorithms—referred to in the industry as "algobots"—that can compute market data, predict movements in the market, and execute trades at lightning speeds in which a few microseconds afford a competitive advantage.[623] These algorithms are coded trading optimisation strategies mostly operating autonomously. Due to the speed at which they function there is little to no human intervention, except as an oversight if they spin out of control. Thus, as Dragos and Wilkins argue, the fault of event like the 2010 Flash Crash cannot be said to lie with any specific actor, but is instead the expression of the potential volatility of the ecological dynamics of contemporary financial markets:

> such occurrences are the kind of irreversible outputs that characterize the hyper-diversity (excess noisiness) of contemporary socio-technical ecology […] HFT strategies are the present culmination of a tendency towards efficiency of information throughput that inevitably ends up offsetting huge volumes of noise to the wider financial ecology […] phenomena such as flash crashes are the inevitable outputs of a financial ecology that tends towards the nonlinear emergence of noise saturation peaks.[624]

Thus to talk about globalised algorithmic capitalism, whether through the object of financial technology or otherwise, is to speak at multiple scales all at once. Ecological dynamics are the driver of events in large-scale socio-technical systems, and HFT functions at a high-speeds and micro-level transactions.[625] This evades human perceptibility and comprehension, to the extent that even those who have privileged access to these technologies cannot be said to have genuine

[621] Estimated at 50% of US equity markets, and between 24–43% of European equity markets (Breckenfelder, 2020).
[622] Easley, *et al.*, 2011.
[623] Cliff, Brown, and Treleaven, 2011, p.14ff.
[624] Dragos & Wilkins, 2014, pp.174–175.
[625] Farmer and Skouras, 2013.

sovereign oversight.

For instance, temporal compression takes place at the level of code and hardware. Algorithmic instructions are simplified and made as short as possible, even moving that code into hardware by translating algorithms, previously held in software, into logic gates based in silicon circuit boards called field-programmable gate array (FPGA's).[626] All this adds to an increasing opacity of algorithmic decisional processes.[627] This opacity can happen because of the high-dimensional, distributed representations of neural networks, or because the processes, such as those of high-frequency trading, happen at speeds or scales outside the range of human perception.[628]

This issue of inhuman timescales operating within financial markets has global consequences. Ultra-fast extreme events (UEEs) that take place at speeds far beyond human perception times cause global market instability, and are common enough that Johnson *et al.* argue that the financial market is now in an "all-machine phase".[629] In a paper titled 'Abrupt Rise of New Machine Ecology beyond Human Response Time' they note that

> there may indeed be a degree of causality between propagating cascades of UEEs and subsequent global instability, despite the huge difference in their respective timescales […] a coupling between extreme market behaviours below the human response time and slower global instabilities above it, shows how machine and human worlds can become entwined across timescales from milliseconds to months.[630]

The frequency of UEEs in finance raises the question of whether there are ultrafast extreme events in other large-scale socio-technical systems. The global financial market may be uniquely advanced in terms of machine-to-machine interactions because of the amount of capital investment in financial technology, but as other infrastructures integrate computation that operates at rates beyond human intervention, analogous machine-phase dynamics like UEE events might arise.[631] One site for the development of such dynamics could be smart cities, for example, considering the IoT infrastructure relies heavily on machine-to-machine interaction.[632]

Another ecology of machine-to-machine interaction is the web. For example, several studies have documented the emergence of complex and unpredictable dynamics in automated bot

[626] Cliff, Brown, and Treleaven, 2011, p.19.
[627] Burrell, 2016.
[628] It is worth noting that these temporal problems are not only perceptual. The same technical systems also operate outside of the time available for ecologies to compensate for the amount of energy being used, or of society to compensate for the amount of power being agglomerated and mobilised.
[629] Johnson *et al.*, 2013.
[630] *Ibid.,* pp.2–3.
[631] Johnson *et al.* 2012.
[632] Gazis, 2017.

interactions on Wikipedia. Wikipedia is a socio-technical system with complex dynamics produced by interacting agents, both human and machine. The number of active bots on Wikipedia is high, with "2,589 bot tasks approved for use on the English Wikipedia" occurring to Wikipedia in 2022.[633] These include editing bots, anti-vandalism bots, and content generation bots. The majority of the top Wikipedia editors and content creators are bots, with the most prolific bot, "Lsjbot", having created 24 million articles.[634] While many of these bots are simple if-then bots, like anti-vandal bots,[635] or double-link simplification bots,[636] as Geiger and Halfaker demonstrate, "even relatively 'dumb' bots may give rise to complex interactions."[637] Hilbert and Darmon support this finding, highlight that while bots are designed as optimisation tools to ensure predictability, they actually result in a high level of complexity and unpredictability at the macro-level of the communication process on Wikipedia.[638] Hilbert and Darmon partially attribute this unpredictability to the frequency of extreme edit events induced by chain reactions of bot interaction, which they equate with the UEE observed in financial markets.[639] These interactions come in various forms, for example, bot-to-bot revert edits have been described as bon-on-bot conflict,[640] although, this negative connotation has been refuted by others, arguing that often these bot interactions are an example of collaboration and are productive in Wikipedia governance.[641] A perhaps more value-neutral description, capturing the complexity of both antagonism and collaboration is Nathaniel Tkacz's term "bot micropolitics".[642] However described, they demonstrate emergent behaviours from simple algorithmic agents. Further effects produced by the presence of bots on Wikipedia includes a lack of demographic diversity and an overrepresentation of "middle-aged white guys" as editors.[643] This is attributed to bots aggressively editing articles that do not fit with standards and protocols, which has been shown to disengage new editors, and therefore only serves to reinforce the power of editors with experience and technical knowledge of Wikipedia.[644] Once again, optimisation results in unforeseen macro-dynamics.

If ultra-fast extreme events become the norm across the board, the understanding of socio-technical systems becomes less straightforward. The unpredictable nature of such events reduces

633 'Wikipedia:Bots' s.v.
634 As of June, 2022: Wikiscan. (n.d.).
635 Geiger and Ribes, 2010.
636 Geiger and Halfaker, 2017.
637 Geiger and Halfaker, 2017.
638 Hilbert and Darmon, 2020.
639 *Ibid.,* p.684.
640 Tsvetkova *et al.*, 2017.
641 Geiger & Halfaker, 2017.
642 Tkacz, 2014, p. 112.
643 Dobusch, 2013.
644 Halfaker *et al.*, 2012.

the control over machine ecologies, hence Haff's earlier quoted description of complex technical systems being autonomous.[645] This autonomy is driven by computational logics enacting encoded norms and protocols but gaining a self-perpetuating momentum. The evolution of these systems includes human agents, but without oversight there is a self-finality of the system according to its own internal logic. The interactive dimension is, ironically, key to this self-finality. The openness of the system to environmental interactions introduces contingency into the operation of the computational process, meaning that the intentions and expectations of software designers cannot fully determine the real-world functioning of the programmes and systems they design. In a study by Woolley *et al.*, in which they interviewed social media bot programmers, the researchers found that while these bots function as proxies that amplify and extend the agency of their builders, the bots are also changed in the process and therefore supersede and resist the agency of the builders.[646] Woolley *et al.* argue that bots have

> a capacity for effecting sociality in ways beyond those envisioned by their creators. This effect is not a conscious decision on the part of the bot. Rather, it is a motion set in action via the bot through a diverse ecological social system that prioritizes not only the intent of the developer but also that of a broad, and networked, public comprising people, software, and machines.

As I have already highlighted, the ecological dynamic is key to understanding the individuation of these systems. The machinic imaginary is instituted within this broader context of human-machine ecologies, creating flows of signification invisible to human actors. We might be able to discern the presence of these machinic significations in terms of the effects they produce, but my argument is that they escape full comprehension, and that these ecologies constitute an example of a being-for-itself.

Nevertheless, despite the emergent dynamics of machine-to-machine interaction, politics and social norms are still present. As mentioned in Chapter One, Florian Sprenger, writing about internet protocols and surveillance, argues that attention must be paid to the micro-decisions that take place automatically in computational processing of data, and draws links to the human social intentions that they are tied to. Springer writes, "Micro-decisions appear at first as an effect of current changes and as a technical manifestation of global exertions of power." However, he follows with the caveat that: "On its own, this perspective is insufficient."[647]

Sprenger's argument turns around an unwillingness to place the sovereignty of the decision in

[645] Haff, 2014.
[646] Woolley, Shoery, and Howard, 2018, p.61.
[647] Sprenger, 2015, p.20.

either the hands of human designers and programmers, or the technical mechanism of the algorithms making the decision at each moment. Instead, the function of power is more diffuse; while there are hidden socio-political intentions behind every protocol, the actual enactment of the decision ultimately escapes the complete control of human intervention because they take place at rates and in quantities beyond the scope of human perceptibility. Sprenger's analysis can be extrapolated to include automated decisional reasoning in all areas of digital culture, such as the micro-decisions in HFT and the financial regulations surrounding them.[648]

For example, an advert for a hardware component called "iXecute" by the company FixNetix, highlights how micro-decisions and politics play out in the protocols of digital financial technology. FixNetix advertises its hardware component as being able to "enforce the pre-trade checks required by trading regulation 'in single-digit microseconds'". This marketing illustrates the need for speed in computerised trading colliding with the legal system. The regulatory checks, required and encoded into law, are encoded in a different sense into this hardware to save time. Micro-decisions are linked to decisions made at larger scales of national and regional regulating bodies, in a chain that includes human and non-human actors, each acting and reacting to one another. This is one way in which the technological dimension of the social imaginary is less a creative source than a sedimentation of social significations that become difficult to contest as they fade into infrastructural "grey media".[649]

Another layer to this complex mesh of decision making in finance is the role of machine learning programmes used for big data analysis in finance. These programmes feed into the decisional frameworks that inform other areas or processes. In high-frequency trading, for instance, a machine learning algorithm will often automatically set the parameters of trading algobots, based on conclusions it has drawn from data analysis. Predictive analytics is also a key tool in the armoury of less high-speed forms of trading that include more human involvement.[650] Thus, even decisions being made by humans are informed by a view of the market that includes everything from predictive analytics derived from weather and stock prices[651] to social media analytics like sentiment analysis and "Twitter buzz".[652] AI has become the epistemological infrastructure of financial trading, inflecting the dynamics of the market with a computational image of the world.

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[648] Again, to demonstrate the example of finance can be extrapolated to other socio-technical systems, the same can be said of Wikipedia Geiger, 2011. See also the broad literature on algorithmic governance, such as: Gritsenko, *et al.*, 2022.
[649] Fuller and Goffey, 2010, p.156–157.
[650] Hansen, 2020.
[651] Denev and Amen, 2020.
[652] Hansen and Borch, 2022.; Si *et al.*, 2013.; Zhang, Fuehres, and Gloor, 2012.

In what is known as "straight-through processing" pre-trade analysis will automatically set the parameters of autonomous trade execution algorithms. In this form of automated trading, everything in the trade transaction process is done by the computer, often as a purely machine-to-machine interaction, with no human intervention at any stage. Lack of intervention does not, however, mean there is no human-social dimension to the process because, after all, finance is a social system. It is embedded in society, with the machine learning programmes crunching data taken from social interaction within finance, but also outside in the 'wider world'. For example, certain trading strategies will deploy the use of machine learning programs to predict market movements based on data gathered by trawling news sites for significant events that could affect the market. This adds another dimension to the effect of policy decisions of governments, corporations, and individuals. A particular tweet by an influential economic actor or political figure can cause significant market effects if news-reading algorithms deem it significant. However, this effect is also necessarily indirect because it is refracted and shaped by the mediation of algorithmic micro-decisions.

Another set of machine learning technique used in pre-trade analysis are human sentiment strategies. These programmes scan social media feeds like Twitter, Facebook, and Instagram to build a picture of levels of social anxiety or positivity, which then informs trading decisions.[653] Once again, there is this fluctuation between scales of micro to macro with algorithms reaching out into the social world to gather data for market prediction—the social world is folded into the automation of finance.

As already explained, machine learning can be described as: computation working through the repetition of open-ended rules responding to interaction with an environment. Crucially, this is a *generative* computational form of knowledge production because it takes data and generates *new* knowledge through statistical prediction and inference. This institutes social significations, as this new image of the world is articulated in application as social activity. Thus, with the introduction of machine learning, rather than the phenomenological questions regarding the uselessness of human perception at the timescales of high-frequency trading, instead there arises a perhaps more profound, epistemological question concerning data analysis. How do machinic visions of the market, generated by the logics of computational reason, distort or augment the human view? There is a post-phenomenological problem at stake here to the degree that the world articulated by cybernetic finance is partly obscured and functioning autonomously. When human intentionality—this could be, for instance, in the form of a hedge fund, but also a regulator—attempts to enter a financial market that includes this machinic dimension, there is always an

[653] For example: Simões, Neves, and Horta, 2017.

invisible excess of signification driving the evolution of the system, remaining, therefore, beyond explanation. Not in the sense that our cognitive maps are always partial and situated, unable to encompass the totality of capitalism,[654] but because there is a dimension of the social world that is phenomenologically inaccessible in that it is of a fundamentally different logical-aesthetic order.

Machine learning in finance is a reminder of the complexity of socio-technical systems, and that, with the increase in automated decisional reasoning and big data, these systems are getting even more complex, and therefore require new approaches to the study of the social world. The decisional processes unfolding at every moment in our mediated world are encoded with rules, regulations, and biases that already exist in the social. In that sense, media reflect an image of humans who use them, however, this image is amplified and distorted by the rational adherence to optimisation logics at work in machines, logics that are not so human after all.[655] Additionally, the local-level articulations of world by machine learning models create proto-significations, which are instituted if they successfully find purchase in social activity long enough to form patterns of behaviour.[656] These local-level patterns interact and overlap into larger global patterns that reshape the environment in which they are embedded, and ultimately the transsubjective patterning that institutes the social-historical. Due to the computational quality of these patterns derived from the articulation of a problem space by a machine learning algorithm, they elude understanding in the ways described in this chapter and the last.

To reiterate what I mean by this, consider the question of what it means to think ecologically about the phenomenological concept of worlding as a distributed process. In deep learning, a concept is a distributed representation existing as a set of connections and weightings in a neural network. It is therefore a local but de-centralised form of distributed representation in that no specific node in the network can be said to represent the concept, rather the concept is a pattern activated by the appropriate input. Within large-scale machine ecologies the activity (output) of these local patterns serves as the input for other algorithmic processes and deep learning models—either directly in machine-to-machine interactions, or indirectly via some environmental medium like a Wikipedia page. The myriad local patterns weave together into a larger tapestry to form a de-centralised, global pattern. Taken as a whole, information flows of financial markets are a distributed representation—or patterning—of a financial 'world'. In this sense the world articulated by large-scale machine ecologies are radically divergent from an

654 Jameson, 1991, p.51ff.
655 For an example of how big data analysis can distort and mislead: Lazer *et al.*, 2014.
656 A useful conceptual comparison here is to Vygotsky's (1987) differentiation between "pseudoconcepts" as less generalised "concepts" that emerge in social activity (p.100).

individual human lifeworld; there is no centre where one can locate a site of consciousness or selfhood, for example. Instead they are a machinic articulation of a social lifeworld, i.e. the social imaginary.

Learning, Time, and History: Reconfiguring the Post-Phenomenological Problematic

Change at the level of large-scale computational ecologies is a question of social time. It is historical change, to the extent that "history" is the broad, complex, and often self-contradictory social experience of temporal existence (as the concept "social-historical mode of becoming" implies). A theorisation of history is important in terms of understanding how social worlds are created and individuate over time. This question of history is also a means to understanding the transsubjectivity of social-historical modes of being. The machinic imaginary is situated in the social-historical, therefore, in the study of the social-historical we might untangle the effects of the machinic imaginary. While the machinic imaginary has a historicity of its own, is also a force of history as a dimension of the social-historical. The machinic imaginary is not a sudden rupture from the pre-existing social imaginary, it is immanent to the individuation of the social imaginary, both in its emergence and divergence. This is because world articulation by large-scale machine ecologies, and the patterning of machine learning, take place within the social field, fed by social data, and interacting with the dynamics of the social activity. Over time, with the instituting force of computational processes organising the social field, a slow drift in social imaginary institution may take place until part of the social imaginary is completely separated and autonomous from human activity and experience.

Encountering computational media through the lens of post-phenomenology has allowed for a description of machine learning as the emergence of this new machinic world articulation. Historically, the primary mode of experience that constituted the ground of the social-historical was human experience, expressed through social action.[657] Now that there are autonomous or semi-autonomous computational 'agents', or better yet, *vectors of experience* acting and interacting in the social world. A complete description of social-historical experience must include these subjective subtendencies of computational world articulation.

The history of the development of the capacity for machines to learn is a history of the artificial creation of a novel mode of existence; the human creation of the experience of another, which in

[657] I say primary, not sole, mode of experience because it is important to retain space for non-human agents acting in and on the social world, from gut bacteria to climate systems.

turn rebounds and changes the mode of existence of the human. With machine learning, humans have inscribed into the inert matter of silicon circuitry their psycho-biological capacity to invent and self-invent. Yet endowing machines with this creative capacity for invention does not mean that those machines replicate a human form of creativity. The creative affordances of computers emerge through a *transformation* of the human capacity for creative expression of the world, as much as it is a transference: by inscribing this capacity into inert matter, the capacity for creation has been reconfigured in a new form. Computation itself is a mode of experience in the sense of expressing a world-for-itself. This computational mode of experience is an aspect of a broader transsubjective social-historical experience that constitutes the world horizon within which all social experience is grounded.

The concept of the machinic imaginary is an anti-anthropomorphic concept, it is a form of imaginary that is non-human and must be read as such. The point is to describe the expressions of world that arise in the relation between machines and their environment as different from the human expressions of world as we relate to our environment. My intention in developing this concept is to highlight the machinic region of the poly-regional ontology of social imaginary institution, alongside the variation in human experience and other modes of being that also constitute this poly-regionality.[658] This poly-regionality is united in the transsubjective world horizon of the social-historical. Conceptualising the world horizon in this way is to argue that the transcendental conditions of experience are not reduceable to a universal logic but rather a multi-logical magmatic structure; a metastable process of individuation.[659]

Through this post-phenomenological framework I hope to begin to point towards a set of political and ethical problems that arise when we incorporate and take seriously computational technology as a vector of experience within a social-historical dynamic. The reason why such a consideration must be made for computational experience comes from the definition of experience that has been described above: *recursive interaction with an environment that creates a world of its own*. This definition is intentionally abstract; proscribing any more to the notion of experience in phenomenological terms runs the risk of falling back on the idea of transcendental consciousness, or a collection of intersubjective conscious selves that do the experiencing. As I argued in Part I, recourse to the notion of consciousness is inadequate when describing the transsubjective experience of social-historical becoming. The transsubjectivity of the social

[658] While this thesis is focused on the machinic institution of world, there are other non-human articulations of world worthy of consideration in relation to the institution the social imaginary. See for example: Cerulo, 2009.; Wadham, 2021.

[659] In this there are parallels to another stream in the afterlife of phenomenology that can be found in the work of Jean Cavaillès, and his phenomenology of the concept, which was taken up by Georges Canguilhem and Michel Foucault. An excellent overview of the phenomenology of the concept, see: Thompson, 2008.

imaginary is composed of myriad subjective subtendencies that together constitute a metastable transindividuation.

Conclusion to Part II

To conclude, Part II was broken into three chapters, each of which attempted to describe this concept of the machinic imaginary from a different angle. The aim was to present the machinic imaginary as a speculative version of an empirical 'object' that forces thought in a new direction. The proposition of the machinic imaginary as a concept is that a bifurcation of the social imaginary is taking place. This requires a re-evaluation of certain commonly-held but unexamined theoretical presuppositions in the contemporary literature outlined in Part I.

One of the main targets of this problematisation is the implicit voluntarism and overextension of theoretical interventions that can broadly be categorised as the "politics of the imagination". There is an optimistic tendency in contemporary critical theory to emphasise the power of the imagination and creative capacities of human beings. The caricature of this tendency is theoretical or artistic intervention that posits that it is simply enough to imagine alternative "elsewheres and otherwises", different versions of society, the human, and social relations. This is the conjecture that by multiplying alternatives we will somehow break free of capitalist realism. While there is value in the proliferation of alternatives as a political tactic, there is also value in understanding the limits of this tactic: mere propositional politics is not enough, a praxis is also needed. Aside from certain hyperbolic exclamations, however, there is usually adequate nuance and sobriety of critical thought in discourse around utopian thought.[660] I hope to add to the latter by exploring the limits of the imagination in its own right, i.e. how does one define such a limit and where might one locate it? The machinic imaginary functions as heuristic tool for locating at least one potential limit, in that it is illustrative of the lack of unitary structure of the social imaginary.

This tendency for voluntarism and optimism is in fact my core criticism of Castoriadis' philosophical project. As Castoriadis describes it, social-historical becoming is the ongoing institution of a social imaginary that has no external law-giving cause, but rather that the nomos of society is immanent to social-historical institution. Therefore the revolutionary "project of autonomy" is to bring about a situation in which society creates itself through deliberative activity and reflection (praxis). However, Castoriadis' proposition is predicated on a particular

[660] See for example Bloch, 2000; Jameson, 2007; Olin Wright, 2010.

rendering of technology as mere tool and extension of human labour.

Simondon's philosophy of technology suggests an alternative, that there is a self-directed ontogenesis of technology, which therefore has an existence that is always in excess of human intention. At the same time, Simondon argues that it is a category error to separate culture from technical becoming, and that to do so is the source of a form of alienation from the reality of human and technological co-constitution. Also an optimist, Simondon ultimately believes that this alienation can be overcome with proper understanding of technical mode of existence. Yet, what if there is an aspect of technical ontogenesis that is in fact so thoroughly immanent to its own mode of existence that it escapes human comprehension? This is supposedly resolved by redesignating the category of the human to always-already contain the technical (as Stiegler does). However, even with this posthuman reconfiguration, there is too often a residual precedence given to anthropic intentionality (as argued in the critique of the phenomenology of technology in Chapter Two).

The concept of the machinic imaginary is a provocation to explore the limit of what is possible in the projects of these two thinkers. That is, that while the social imaginary *is* immanent to social-historical becoming, and the nomos of society *is* created by society itself, there is nevertheless an aspect of society that is a non-conscious technical mode of existence articulating a world-for-itself. The machinic imaginary might never become reflective in its institution, yet it can have an ontogenetic (quasi-)independence from human intention. This paradox means that the machinic imaginary can never be included in the deliberative and reflective action that is needed to bring about a fully autonomous society, of the kind described by Castoriadis, because it cannot ever be fully known. This is the core problematic raised by the proposition of a machinic imaginary, and with which Part III of this thesis is concerned. Yet the bifurcation of orders of the social imaginary, into human and machinic imaginary institutions, does not require a departure from Castoriadis. Instead, it is better to transform his theory of the social imaginary to include the machinic imaginary, using the post-phenomenological tools both he and Simondon provide. In the speculative encounter with the machinic imaginary, the post-phenomenological framework of this thesis is thus further transformed by a new problematic. As I argued in Chapter Three, the transsubjective character of the social-historical is a core post-phenomenological insight, which is foregrounded by the machinic imaginary problematic. Thus, the post-phenomenological line of thinking is driven to questions of fragmentation, alterity, opacity, access, and translation, and ultimately what this means for thought and critique. It is to these topics that Part III will turn.

Part III

Chapter Seven: Fragmentation, Alienation, Responsivity

General Introduction to Part III

> It may be assumed that every epoch (more specifically: every culture, society, environment, or form of life) behaves within certain boundaries, but that the relation to the boundaries, which is always accompanied by a certain politics, is subject to significant variations. The ways one handles boundaries serve as a clear indication of the underlying spirit of an epoch…[661]

In the previous few chapters I have argued that the machinic imaginary is a divergent series of social imaginary significations that are fundamentally non-human. One of the aims of this thesis has been to present an alternative analytical description of computational society from which to approach the question of the political that does not reduce technology to a singular, totemic instrumentalisation of cybernetic-capitalist logic (*cf.* the literature surveyed in Chapter One). In so far as this has been achieved, it does not resolve into a politics of computational society unproblematically. Rather, a different set of problems appear in this new light. The two chapters that make up Part III will therefore set out the implications of this onto-phenomenological articulation of the computational world, in that it exists and participates in the social world, but remains withdrawn from human experience. Chapter Seven covers the themes of fragmentation and alienation, which will be discussed in relation to issues of opacity and interpretability of machinic signification. I will explain what I mean by each of these terms and explore the extent to which they are novel problematics, in the sense of questions to be posed of the social imaginary after the emergence of the machinic imaginary. I do not presume to have a definitive resolution to such problems, however, Chapter Eight will conclude this section of the thesis by pointing to a politics of transindividuality as a possible area for further investigation of the various problematics raised by the thesis.

Part III should be read as a reprise of the themes raised in Part I *in light of* the thesis of the machinic imaginary presented in Part II. The questions posed in this chapter (and the general conclusions of the thesis) are nested within a broader context that was foreshadowed in Chapter Three (most explicitly in the section on "The Inadequacy of Intersubjectivity"). This context is

[661] Waldenfels, 2011, p.9.

the fragmentation of the world brought about in late modernity, and the insight that the world is not unifiable within a single order or overarching theory of everything.[662] Accordingly, the current chapter explores the tension that arises with the assertion of a multi-logical, poly-regional ontology, with specific regard to the example of self-differentiation of the social imaginary into a partially machinic imaginary. Two of the key thematic tensions explored in the following are intelligibility and the alien, through which the discussion will finally circle back to the initial questions regarding politics posed in Chapter One.

In broad strokes, the question of intelligibility is the question of the possibility of communication between different logical-aesthetic orders (worlds). Under this heading I will consider the specific question of intelligibility between human and computational modes of articulation, and explore the opacity of the machinic imaginary on the one hand, and the processes of translation on the other.[663] How does one traverse between human and computational articulations of the world, if each is so fundamentally alien that it is an order unto itself, its own macrocosm or cosmological construction in the original Ancient Greek sense of *kosmos*? Moreover, where does one order break down and another constitute itself and is it possible to speak of an abstract zone that borders two different orders? Do some borders overlap and if so, where, and how do we speak of these overlapping zones? In the case of the machinic imaginary as a dimension of the social there is a coexistence between machinic articulations and human social imaginary significations because they are both expressed in social action. Phenomenologically, however, there seems to be a fundamental divide that is unbreachable, a solipsism that only resolves at a "higher" level of the transsubjectivity of the social-historical mode of becoming. What does this inaccessibility between orders entail, therefore, and what problems might arise because of this breach? Politically, this is a problem for the politics of the imaginary, represented here by Castoriadis' project of autonomy. The machinic imaginary poses a serious roadblock to an elucidation of the social imaginary if it is partially obscured by the machinic imaginary.

The question of alterity is a staple of the phenomenological tradition, where it has largely been couched in terms of recognition and the other. It would be amiss to not engage with this

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[662] Waldenfels, 1996.

[663] The figure of the "human" here is used as a "generic" category to distinguish from computation. However, the intention is not to reinstate a universal human condition. The same analytical discussion of fragmentation and multi-logics can take place at the level of different genres of human (Wynter) or cultural articulations of world (Viveiros de Castro; Árnason), or the variation in relations between different humans with non-humans (Haraway). These questions about the categorisation of the human are here bracketed for purposes of scope, but I am nevertheless implicitly drawing from this discourse to think through the relation between (generic) human and computational modes of articulation. On the concept of the generic: in *Being and Event,* Badiou describes the generic as: "a multiplicity that no particular predicate can circumscribe (2006, p.xiii); *cf.*: Laruelle, 2008, Agamben, 1993, pp.1–2.

discourse in a thesis that seeks to explore the role of difference in the constitution of social world as a pluralistic, multi-logical world. However, as a traditional phenomenological course is not being forged here, the post-phenomenological emphasis is on alterity as an (onto-)logical problem, which precedes or supersedes any humanistic phenomenology that assumes a shared medium of "consciousness" predicating the possibility of recognition. The question of alterity is instead here couched in relation to, and arises with, the proposition of multi-logics. That is, the ontology of social experience is multi-logical and differentiated, thus alterity is an irreducible feature of the social-historical. Following contemporary post-phenomenological developments of alterity, the following discussion will draw on Waldenfels' *Phenomenology of the Alien*. This venture into ethics is to think through and reflect upon the question of intelligibility, with a view to the following chapter.

In Chapter Eight, I finally return to a reworking of the initial problematic of the thesis: what sort of technopolitics can be envisaged after having so decisively affirmed a breach at the heart of social-historical institution? To do so I revisit the concepts of transsubjectivity and praxis first introduced in Part I. The politics of transsubjectivity is employed in the analytical framing of the political, while accounting for a fractured social imaginary constituted partially by humans partially by machines. The ultimate question being: what sort of praxis is possible in computational society?

Fragmentation and Multi-Logics

In the mid-twentieth century, Paul Ricoeur wrote: "The unity of human speech is the problem today".[664] This problem remains in the twenty-first century, but it has deepened ever further due to the practical contributions of computer science and engineering adding to the cacophony of voices. As Part II has shown, the development of computational media can be understood as the individuation of a new mode of interpretation of existence: the machinic imaginary. Despite being named universal machines,[665] the modern computer and the systems they comprise are a novel expression of being, alongside those already present in transsubjective. Computation is therefore a clear extension of the logic of modernity characterised by fragmentation. It is fitting that the modern computer and its derivative forms are products of the "century of distraction, disintegration, and collapse" and the end of meaning, as Jean-Luc Nancy has described it.[666]

[664] In reference to the multivocal hermeneutics of being expressed by the dislocation of discourse as many different disciplinary methods attempt to interpret the multiple facets of existence. Ricoeur, 1974, p.16.
[665] Turing, 1937.
[666] Hörl, 2013, p.11.

The fragmentation of the universal plays out in any manner of ways in contemporary culture, one example being the siloed nature of research disciplines struggling to communicate, as Ricoeur notes in the extended passage from which the above quote is taken. Such a case made clearer by the processes and products of interdisciplinary research, which, in providing new perspectives and problems, becomes an ecology of ever-fragmenting micro-disciplines. No one discipline is either better or worse at adequately describing the world, but none can do so in its totality. This situation of an impossibility of epistemological unification is perhaps the root of the craving for a 'theory of everything' that has become the renewed object of contemporary desire in some quarters. That desire for the absolute, it seems to me, will remain forever unsated, but this is not a problem *as such*. In fact, I would argue, as many have before, that the recognition of a diversity of "situated knowledges", breaking with the modern idea of science and objectivity as a view from nowhere (the "god trick" as Donna Haraway named it), is to be welcomed and fostered.[667]

Even if it is welcome, this does not mean that fragmentation does not pose new problems, far from it. However, as noted in Chapter Three, problematisation is the wellspring of theoretical enquiry, and therefore to be embraced: to quote JP Árnason again, the "transition from a closed world to an infinite universe can serve as a guide for the interpretation and the modern relation to the world if we conceive of it […] as the entry into a new configuration of problems."[668] For example, the ontological commitment to plurality comes with the requisite problem of how each region of being, if it is radically for-itself, relates to the other regions of being-for-itself without either, on the one hand totalisation and the collapse of difference or, on the other, fragmentation (the problem of the one and the many). Thus abound a series of questions about orders such as those raised earlier.[669]

The ontological proposition of the machinic imaginary follows the various attempts from the past century or so to construct multiply-ordered or poly-regional pluralist ontologies, such as the philosophy of William James, Alfred North Whitehead, or Deleuze and Guattari to name a few examples. More recently Actor Network Theory, new materialism—such as in the work of Karen Barad—object-oriented ontology, and decolonial theories of the pluriverse all tend in this direction. Multi-perspectival epistemologies and ontologies, such as found in the work of

[667] Haraway, 1988.
[668] Árnason, 1992, p.251.
[669] These questions articulate differently depending on the category of order in question: epistemological, phenomenological, or ideal orders are unlike the physical ordering of space. The former can coexist and overlap in space and time without interaction or an abstract topological relation only. Between orders of meaning, for example how does one demarcate a boundary, where does sense become nonsense—different orders as nonsensical from either side of the boarder looking through—and is it correct to oppose different regions through the binary logic of order and disorder? How do orders interact if they are the dis-order of one another?

Viveiros de Castro, have generated some of the most original and radical works of philosophy and critical theory in recent years.[670] As already discussed, the post-phenomenological philosophy of Simondon and Castoriadis, which this thesis draws upon most directly, both contain within them, and are animated by, a commitment to a poly-regional ontology of various regions of being that cannot be subsumed into a totality.[671] Being is the being of beings, it is expression and becoming and the creation of worlds.

A key finding from these theoretical interventions is that the social-historical is already a plurality, it is already multiple and radically so, both diachronically throughout history and synchronically in the here, there, and now (if not always).[672] A facet of human existence is that the variations in the experiences of the world are myriad and more than the sum of social individuals. These worlds make up ever larger collectivities that overlap and diverge into a transsubjective world of the social-historical (itself a more-than-unity). If to speak of the social imaginary is therefore to already speak of a multiplicity, what then is the significance of the differentiation of the machinic dimension of the social? Is it just one of the many articulations of world that constitute the social? The significance of the machinic imaginary, as a novel mode of world articulation, is that it is truly alien in a way that no human 'other' can ever be. The computational world is of a mathematical kind, composed of patterns derived from statistical relations between parts. Human beings, in all their variation can never think like a machine, process the world in binary code, in Boolean logic, or analyse a high-dimensional problem space of the same magnitude as a computer program.

This incongruity is the nub of the problem of social imaginary institution after the emergence of its machinic dimension. For Castoriadis the social imaginary is completely human, it is an anthropocentric creation through and through, which is why he defines his political project as an ongoing elucidation of the social imaginary. As Castoriadis wrote, each society attempts to give an answer to the fundamental question of "who are we as a collectivity"; therefore, the "project of autonomy" as he sees it is the *reflective* interrogation of that question and *deliberative* social activity in the creation of the social. But how does computational society answer such a

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[670] Viveiros de Castro, 2009.

[671] The post-phenomenological theme is particularly evident here: in Merleau-Ponty the paradox of experience is that it is deeply personal but impossible to explain "What Saint Augustine said of time-that it is perfectly familiar to each, but that none of us can explain it to the others-must be said of the world." (2002, p.1). Or Levinas' critique of totality through the phenomenological argument of overlapping of horizons (Levinas, 1979, p.28 and pp.44–48. On this insistence of plurality by phenomenology see also: Árnason, 1992, p.250.

[672] As Castoriadis (1987, p.182) puts it: "We cannot think of the social, as coexistence, by means of inherited logic, and this means: we cannot think of it as the unity of a plurality in the unusual sense of these terms; we cannot think of it as a determinable ensemble of clearly distinct and well-defined elements. We have to think of it as a *magma*, or even a *magma* of *magmas*—by which I mean not chaos but the mode of organisation belonging to non-ensemblist diversity."

question? In what way does computational reason reframe the asking and answering of the question of who 'we' are as a collectivity? In one way, the same old answers to this question linger, metastasising and intensifying. Social biases, for example, appear everywhere in the algorithmic processing of social life—white-supremacist-patriarchy is hardcoded into the machines we live and think with.[673] On the other hand, computation is also a means by which this question is asked and answered differently, in a different language, so to speak; probabilistically, in mathematical abstractions, through vectors, clusters, and as high-dimensional abstractions. The articulation of the world in computational terms by machine learning produces a radically distorted image, organising the world into patterns that humans do not recognise.

It is in this latter sense that the emergence of a machinic imaginary within the social-historical produces a fundamental alienation that cannot be overcome (without a complete departure from the technological infrastructure that sustains it). This alienation need not be read as fatal however, it perhaps teaches a more rudimentary lesson about the implicit alienation humans have from being more generally. The articulation of worlds by different beings is the inherent expression of being in its infinite (in)determinability. The pluralisation of reason produces different phenomenological orders or different modalities by which the world is expressed as meaningful through the ordering process of signification. As explained in Part II, this is exemplified by the institution of computational reason as a novel means by which the world comes to be articulated. Yet, as different modalities by which being is expressed, these multiple worlds are incommensurable to varying degrees according to the underlying logic-aesthetic of the ordering. Borders between orderings may be traversed to some extent, but it is vital to recognise the limits of integration of different logics or modalities of being. This phenomenological limit renders an ontology of the social as multi-logical and metastable. The different expressions of world weave together to produce a transsubjective world exceeding any one perspective.

Alienation and Responsivity

The creative capacity for the machinic imaginary to institute social imaginary significations changes the condition of being in the world for social individuals. The presence of the machinic imaginary alienates social individuals from the collective construction of the world. The experience of exclusion and disempowerment that this alienation produces is of a further kind to the pre-existing structural conditions of exclusion and disempowerment already experienced by many. The alienation produced by the machinic imaginary derives from an inaccessibility or

[673] Browne, 2015.; Benjamin, 2019.; Noble, 2018.

closing-off of part of the transsubjective field of signification conditioning social experience; *above all else, it is an alienation of social experience from itself*. This alienation connects with and compounds the reduction of autonomy produced by pre-existing structures of oppression.[674] As an estrangement from the transsubjective conditions of the production of the social world, it is a form of *hermeneutic alienation*, in that it prohibits interpretation of the world (by an individual or a human collective).

Jason Read makes an analogous argument regarding alienation from transindividual conditions, via Marx, Paulo Virno and Simondon:

> Alienation is not just loss of object, and control of activity, it is also alienation from species-being [*Gattungswesen*], from mankind's universal nature, what could be referred to as the preindividual and transindividual components of subjectivity. Alienation is not so much the loss of the subject in the object, but the loss of objectivity for the subject, the loss of the relation to its conditions.[675]

Read writes that alienation arises from the commodification of the preindividual in the things, structures, and machines that constitute the conditions of production of subjectivity: "The milieu of our existence, preindividual and transindividual, becomes something we are passively subjected to, something consumed, not something that we can act on or transform, a condition that cannot be conditioned."[676] Read's analysis refers to the economic conditions that organise the production of subjectivity within capitalism, allowing him to subsequently present a possibility of overcoming this alienation by bringing into common these conditions of the production of subjectivity. The machinic imaginary produces an alienation with a similar structure, but which cannot be overcome through a common ownership of the means of production of subjectivity. This is because this alienation is due less to an economic passivity of consumerism (although this is a compounding factor) than it is to the *alienness of computational reason*. The machinic imaginary further obscures transsubjective experience: in the degree to which there is a machinic dimension of the social imaginary, the latter becomes a condition that cannot be conditioned because it is unavailable to human experience.

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[674] In this regard it may be worthwhile comparing the structure of this alienation to the structure to the sociogenic alienation Fanon describes in *Black Skin, White Masks* (2008). Sylvia Wynter (1999, p.13) explains sociogenic black alienation in the following terms: "it is therefore within the terms of a postulated overall "cultural constellation" and of the overall social order to whose production and reproduction it gives rise, that, for Fanon, the etiology of the black man's alienation, is to be found."

[675] Read, 2010, p.124.

[676] *Ibid*., p.124.

This situation therefore encapsulates the double meaning of alienation as estrangement (*Verfremdung, Entfremdung*), and alienation as externalisation, relinquishment, or deprivation of a claim or power-potential (*Entäußerung*, *Veräußerung*).[677] The machinic imaginary is a relinquishment of the institution of the social-historical world to computational infrastructure, and as the expression of a machinic logic-aesthetic it appears as alien (*fremd*). The world as alien implies, moreover, a feeling of estrangement in the world. As Hans Jonas writes:

> The alien is that which stems from elsewhere and does not belong here. To those who do belong here it is thus the strange, the unfamiliar and incomprehensible; but their world on its part is just as incomprehensible to the alien that comes to dwell here, and like a foreign land where it is far from home.[678]

This quote from Jonas' book on Gnosticism perhaps seems a rather esoteric reference when discussing the most contemporaneous of technologies, but it nonetheless highlights the reversibility of the alien. From each side of the threshold between the human and the machinic the other is alien, unfamiliar, and incomprehensible. The machinic dimension of the social imaginary is the becoming-alien of itself. This estrangement is a decomposition of self-comprehension into divergent modalities that order the world in unfamiliar ways. The emergence of the alien reason of computation is immanent to the social imaginary, but it comes "from elsewhere" in terms of the mode by which it organises and expresses the world.

If the fundamental incomprehensibility of machinic signification is an experience of the alien in the social-historical, what are the effects of this alienation? Currently the intensity of this alienation may not be discernible, but one can predict a deepening of such an alienation might be experienced as anxiety, social disassociation, and the inability to comprehend the complexity of social forces. A sense of confusion and disjointedness are produced when events happen that cannot be explained by logically tracing their unfolding because, at a certain point, a darkness shrouds a decision, or a particular catalyst that sparks a chain of interactions is indiscernible. Certain decisions cannot be explained because they exceed any human capacity to comprehend, which undermines any expectation of rational order that might be parsed out with adequate resources.

Waldenfels, writing of the experience of the alien, observes that "before the alien arises as a theme, it makes itself known as disruption, interference, or disturbance, acquiring different

[677] See Torrance, 1981.
[678] Jonas, (2001 [1958]), p.49.

affective shades of astonishment or anxiety."[679] The disturbance by the machinic imaginary already being felt is the anxiety around the singularity, narratives of AI taking over in science-fiction, worries about automation affecting our cognitive capacities[680], economic concern of AI replacing human jobs (usually supplemented by an inability to imagine a world in which we work less and wealth is fairly distributed), and even the faux-disruption to markets by start-ups selling 'innovative' new ways to do the same thing but with an AI component. This latter is also symptomatic of the other end of the emotional register mentioned by Waldenfels: of the alien eliciting astonishment. Astonishment, for example, at the potential for machine learning products to change work flows in commerce, science, or the arts. For every concern regarding AGI and the singularity, there is also wonder at the emergence of a genuine "artificial intelligence" and the ghost in the shell.

Other reactions to the alienation caused by the machinic imaginary may be much more diffuse and are likely indiscernible as effects, to the extent that speculation is all one can offer. A deep incomprehensibility of the forces animating the individuation of the social-historical field could easily become (if it has not already) a contributing factor in processes of decomposition of social organisation, and a devaluation of values. For example, the distrust of science and institutional forms of knowledge and legitimacy (of which a distrust of experts is often noted by commentators), or in the paranoid attitude of conspiratorial politics—QAnon, for example. Jameson argued that conspiracy and paranoia are the "degraded figure of the total logic of late capital, a desperate attempt to represent the latter's system, whose failure is marked by its slippage into sheer theme and content."[681] The alienation produced by the machinic imaginary would certainly seem to support Jameson's analysis insofar as the machinic imaginary occludes the capacity to effectively undertake a cognitive mapping of computational society.

To suggest that the alienation of the machinic imaginary could be a potential source for a twenty-first century nihilism does not seem an overestimation. Coupled with the various onslaughts of capital and the accelerating climate crisis, contemporary experience is often one of disorientation and futility in the face of forces seemingly beyond control—certainly beyond the control of the individual. Returning to the Gnostic theme from above, an interesting parallel can be drawn to the conditions within which Gnosticism arose two millennia ago. Hans Jonas describes the development of Gnostic religious teachings as a nihilistic reaction to the Roman Empire's absorption of the city-states, which created a condition of atomisation and passivity of the *polis*

[679] Waldenfels, 2011, p.81.
[680] Carr, 2014.
[681] Jameson, 1988, p.356.

that had previously constituted those city-states.[682] Whereas the classical doctrine of the whole as prior to its parts—exemplified by Stoic pantheism and post-Aristotelian physio-theology—had previously been able to find support in the lived experience of the *polis*, during the Roman Empire the experience of the whole was that of an indifferent and alien organisation to lived experience. In response to this new circumstance, the Gnostic individual was driven by an aspiration not to act a part in this whole, but to find meaning in individual gnosis in rejection of the *nomos* of the law and, most drastically, of the cosmos entirely.[683] The world—the cosmos—came to signify an alien world created by an demiurge to trap humanity in a state of *agnosia* (ignorance) of the true (Christian) God who was outside the world.[684] Jonas compares this Gnostic nihilism to modern secular existentialism (from Pascal to Sartre and Heidegger), which after the "death of God" diagnosed a similar nihilism in the devaluation of values. With the machinic imaginary, a possible devaluation of values would stem not from a loss of ground (God), but rather from an alienation from the transsubjective institution of the social-historical. A feeling of passivity would be understandable in the face of a machinic production of the conditions of experience in which reason becomes incomprehensible in taking on a computational form. The macro-historical effects of the machinic imaginary, while driven by computational reason, would appear as unreason if incomprehensible to human understanding. The dissolution of appearance of a rational ground (the appearance of a rational ground being the role of social imaginary institution, even while this ground recursively conditions itself), would no doubt elicit some form of nihilistic reaction. If one's implication in the social-historical takes on the character of a disoriented spectator of events that appear totally irrational and yet unstoppable, what psychological response would that produce in individuals and collectives? A gnostic-like interpretation of the world is already present in conspiracy theory, in many ways a rational response to a feeling of the dissolution of sense. As with the gnostic, personal revelation holds much more validity than institutionally derived doctrine.[685] The conspiracy theorist is able to discover a truth that provides a spiritual orientation in a world that appears devoid of meaning, a truth obscured by the world as it appears. If this is already the case, produced by the disorientation of late capitalism as Jameson suggests, it would only be intensified by the ingression of the machinic imaginary.

The pessimistic conclusions I am offering here are not to be read as final but rather as an extrapolation of what responses might arise in light of the machinic imaginary running away with

[682] Jonas, 2001, p.148–149.
[683] Jonas, 2001, p.330.
[684] *Ibid.*, 48ff.
[685] Pagels, 1979.

itself. The question therefore becomes how to avoid this nihilism. The concept of transsubjectivity contains the possibility of a reorientation that avoids fatalistic nihilism, while nevertheless accepting the alienated condition of human experience in relation to the machinic imaginary. Staying with the gnostic comparison, alienation had a positive meaning in the Mandaeic Gnosis, presenting an imperative for the possibilities of interpretation.[686] Gnosis is obscured by the world and thus requires personal spiritual revelation, which can be reinterpreted as the intentional act of reflective articulation. Thus the feeling of ungrounding produced by the experience of the alien, and the recognition of a multi-logical field of institution that cannot be subsumed by 'reason' as a totality, is instead a catalyst for a praxis of autonomy. The reflex of the conspiracy theorist is therefore not necessarily incorrect, albeit misguided if they are simply replacing institutional knowledge with forum posts on 4chan and Telegram messages. An analogous impetus underlies the Jamesonian cognitive cartographer, the conspiracist theorist, Kompridis' reflective disclosure, or Castoriadis' praxis of the social imaginary. The alien demands a praxis of elucidation, of making sense of the nonsensical. The alien can be the impetus for philosophy and reflective social praxis; even if the task is an ultimately futile utopian undertaking, it is nevertheless a meaningful activity.[687]

How does one engage with the alien in this manner, how does one become receptive to the alien in a positive, constructive attitude? The alien nature of machinic signification is the constitution of a radically new being-for-itself within the social, external to human experience but present within a transindividual relation at the level of the social-historical. This paradox of impossible co-presence is why the question of orders, and their interaction is raised by the theory of the machinic imaginary: can divergence and interaction take place at the same time? What sort of phenomenological relation can be figured from such a paradox? In answer to this, I suggest that Waldenfels' 'responsive' phenomenology of the alien presents a possible way forward.

Waldenfels explains that the concept of the 'alien' is different from the concept of the 'other' in that it is not determined in relation to the self. Such a determination takes place within an ordering: to demarcate something, to draw a line around it and a boundary between it and oneself is to impose an order. The alien is a more radical alterity in that it is that which stands outside of a given order. It cannot be said to be defined as an 'other' to a particular identity, because that would be to invite it into the order that defines that identity even in the act of

[686] There is a rich history of alienation as a positive in the history of Neoplatonist and Christian thought that can be found from Gnosticism through Plotinus, Augustine, and Aquinas to Hegel and Fichte. See Ludz, 1981, pp.21–35.
[687] As mentioned in the previous note, this has precedence in philosophy: Hegel's historical dialectic is premised on an alienation of the Absolute for change to occur (Hegel, 1977 [1807]). For Fichte, the loss of oneself in objectivation is a liberation of the I, which reacts to non-I and in doing so enlarges itself. Fichte, 1977 [1801], cited in Ludz, 1981, p.27.

negation. The alien, on the other hand, is constitutive of order in being that which is outside of order—disorder or nonsense. Hence Waldenfels emphasis on borders and thresholds between orders (a concern that I have carried over into the question of the machinic imaginary).[688] The alien is therefore a space of radical otherness in the familiar. For example, the machinic imaginary is the emergence of a socially-constructed world that is non-human (alien) within a social imaginary that conditions the experience of being human (the familiar).[689]

Furthermore, the traditional phenomenological concept of intentionality does not apply to the relation with the alien. Intentionality is the active making-sense of an object by bringing it into consciousness. The relation to the alien is always one of passivity, it necessarily remains in the non-intentional dimension of experience.[690] Waldenfels therefore proposes the concept of responsivity as an analogous term to describe one's relation to the alien instead of intentionality. He writes: "Responsivity goes beyond every intentionality because responding to that which happens to us cannot be exhausted in the meaning, understanding, or truth of our response."[691] Likewise, our relation to the machinic imaginary is defined by passivity because it is something that happens to us. As a dimension of the social imaginary it is part of the structure of experience, yet we cannot grasp it in intentional experience because to do so is to bring it into a human order, stripping it of what constitutes it as a *machinic* imaginary. We are nevertheless affected by the machinic imaginary, this affect, or *pathos* as Waldenfels describes it, is what responsivity is responding to. The pathos of computational society is the experience of the effects of the machinic imaginary, background, (infra-)structural changes that permeate the cultural, economic, and political, yet remain beyond intuitive understanding.

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[688] Waldenfels, *Order in the Twilight*, 1996. In *Phenomenology of the Alien* he reiterates this: "Each order has its blind spot in the form of something unordered that does not merely constitute a deficit [...] In other words: the fact of reason is itself not reasonable." Waldenfels, 2011, p.13.

[689] To clarify, this is not to say the techno-capitalist social imaginary within which the machinic imaginary emerges is the only ground of the human condition, but in those instances in which the latter is the dominant social imaginary, it is being disrupted by the machinic imaginary. A correlate of this is that the category of the human is both reinforced as not-the-machine, while being simultaneously put into question by the machinic dimension within the institution of the social imaginary that socialises and forms social individuals.

[690] Merleau-Ponty's treatment of passivity and its relation to institution is of note here in relation to computational media as tools people actively create and use intentionally, while also conditioning/mediating experience. Passivity for Merleau-Ponty it is not completely passive in the sense of being something that happens to the subject (the subject is not simply a product of history), rather passivity is a mediation between the passive and active dimensions of experience. In this regard passivity is related to Merleau-Ponty's notion of institution (the capacity to begin), which he uses in place of the overly ego-centric and voluntaristic phenomenological concept of constitution. For Merleau-Ponty the subject does not constitute the world of perception but institutes perception from the context in which they find themselves, with all the historical weight that the present moment brings to bear. He therefore understands passivity as the mediating and generative relation of institution of the passive in the active (see Merleau-Ponty, 2010). For an excellent discussion of the mediating role of passivity see: Huges, 2013. On the notion of generative passivity see: Beith, 2018.

[691] Waldenfels, *Phenomenology of the Alien*, 2011, p.28.

Waldenfels' notion of responsivity thus presents a potential model for a phenomenology of the machinic imaginary. However, a question remains of whether such a phenomenology can open a space for thinking about ethical or political modes of activity in a context conditioned by the machinic imaginary. Responsivity is dialogical in structure, Waldenfels highlights the expressive character of the dialogical, which is a creative, open-ended activity of interaction. The open-ended aspect of responsivity is necessary in accounting for the ever-present incompleteness relating to the alien. Although not a solution to the problem of machinic signification, which is by definition insurmountable, responsivity is a good place to begin the search for how to engage with the machinic imaginary: to become attentive to those moments where the *pathos* of the machinic imaginary is conditioning experience, and from there to interrogate the process by which sense-making is realised in such a context.[692] If understanding of the alien is not possible, *generative interpretation* (a poetics of translation) may serve as response. As Waldenfels writes:

> the response does not follow the pathos as a second event; in fact, responding means nothing more than the way in which the pathos takes effect. This effect is realised by a certain transformation. That *by which* (*wovon*) we are touched turns into something *to which* (*worauf*) we respond by various acts of turning towards and turning away. *I become who I am by responding in a certain way*.[693]

Responsivity is an act of self-determination. The (post-)modern gnosis of responsivity can therefore serve as a model for answering the question of 'who we are as a collective' while recognising that the 'we' is heterogenous and elusive.[694] It is the process of institution—as beginning and as generativity—that takes place in a context of multifarious institutions, some of which are radically alien.

This responsivity to the experience of the alien occurs in the play of the borderland, the *Zwischenwelt* [in-between world] of the human and machine articulations of the social, and therefore this is where an engagement with the alien must take place. This borderland is present everywhere humans and machines both play a role in decision making and other social doing. Even when there is no 'direct' human-computer interaction as such—for instance, policy interacting with the unfolding of an algorithmically-driven decision is interaction from a distance

[692] This chimes well with the ethics with which Don Beith (2018) concludes his discussion of the concept of generative passivity he develops from Merleau-Ponty.
[693] Waldenfels, 2020, p.346
[694] The heterogeneity of the 'we' refers also to human communities of course, that is the main question Waldenfels is concerned with. The introduction of non-human into the discussion of the alien is my own. It need not be delimited to the machinic either, Waldenfels phenomenology of the alien presents an interesting way of thinking about non-human animals and all non-human entities more generally.

due to the different scales at which the two operate—human-computer interfacing is nevertheless the thematic core of this discussion. Whether it is a GP interfacing with a diagnostic expert system on their computer screen or the collection and processing of online sales data to understand consumer trends to adjust prices, in each case, an interaction is taking place that informs an agent's decision.

The extent to which the borderland between machines and humans can be traversed boils down to the question of intelligibility between orders. For the sake of analysis, the possibility for intelligibility will here be divided into two categories, the problem of opacity and the process of translation. Opacity designates the degree to which world articulation within one order is intelligible from another order. If both orders share common points of phenomenological ground (determined by logical-aesthetic affordances), the expression of the world can be communicated, albeit partially. Opacity arises where expression draws upon an aesthetic capacity-to-determine or a mode of reasoning has no equivalence with the expressive capacity of the other (alien). Communication and intelligibility require anchor points of mutual recognition of some conceptual terrain. Translation is therefore the process by which isomorphisms within each order are discovered and leveraged to facilitate a dialogical relation. This notion of translation draws upon the originary encounter between two orders, rather than, for example, the translation of a text from Spanish to English by a translator that already has a fluent command of both languages. In the originary encounter, the initial search is for common signifiers, or "boundary objects", to use as a 'Rosetta Stone' that can provide access to the order of the other.[695]

If the machinic imaginary produces a radical alienation of the type I have been describing, then the scope deliberative reflection and intentional action has in the rearticulation of the social world is limited. It is unclear whether this can be overcome within such a condition, and therefore efforts must be directed towards those sites in which intervention can take place. The unintelligibility of the machinic imaginary also suggests that strategies and tactics of action from a distance, which can filter through to the machinic imaginary, need to be developed. The traversal of orders is not possible, but there can be indirect mediation between orders by leveraging an understanding of how the social is metabolised by machines. Total comprehension is perhaps not necessary to reengineer the effects of the machinic imaginary, but to do so is an immense task that will not be simple.

[695] Star and Griesemer, 1989.

Opacity and Interpretation

Opacity of the machinic imaginary operates at multiple levels. As discussed in the previous chapter, a particular phenomenological and cognitive opacity operates at the macro-level of large-scale machine ecologies in which emergent dynamics can be highly unpredictable. The layering of algorithms-upon-algorithms, systems-upon-systems, leads to complex behaviour that becomes extremely difficult, if not impossible to penetrate. This is the field of activity of the machinic imaginary in its fullest self-expression, unintelligible yet part of the pathos and background structure of social life (i.e. the machinic dimension of the social imaginary).

Within these movements of the machinic imaginary dimension of the social-historical are the micro-processes of machinic (proto-)signification discussed in Chapter Five. These processes of machinic signification are obscure and uninterpretable by humans, even those with the requisite technical knowledge and skills.[696] As Jenna Burrell succinctly phrases it, this form of opacity "stems from the mismatch between mathematical optimization in high-dimensionality characteristic of machine learning and the demands of human-scale reasoning and styles of semantic interpretation."[697] An example of this can be seen in an experiment by Szegedy *et al.* in which they found that the properties an image classifier learnt were uninterpretable and counter-intuitive.[698] By making imperceptible non-random perturbations to an image, the researchers caused the CNN to arbitrarily change its prediction, i.e. it incorrectly classified an image that appeared to the human eye to be identical to an image it had previously correctly classified. This could have been an extreme case of overfitting if it were not for the fact that the model was able to generalise well. Instead, what this implies is that certain highly abstracted micro-features, captured in the semantic properties of individual units within the network, can be undiscernible to humans yet important enough to change a classification. How this potentially plays out at scale is the concerning property of the machinic imaginary.

Interpretability is a particular challenge in deep learning because ANNs are typically comprised of very large networks of neurons with many more connections between them, distributed representations, and data that changes as it passes through the network. However, high-dimensionality is also a problem in other machine learning approaches too, as Lipton notes: "…neither linear models, rule-based systems, nor decision trees are intrinsically interpretable. Sufficiently high-dimensional models, unwieldy rule lists, and deep decision trees could all be

[696] Epstein *et al.*, 2018.
[697] Burrell, 2016, p.2.
[698] Szegedy *et al.*, 2014.

considered less transparent than comparatively compact neural networks."[699] This makes the task of tracking the decision-making process, or reverse engineering the rationale behind a decision made by an ANN very difficult, thus posing legal and political problems regarding accountability. If we cannot discern the rationale behind the automated decision systems that power vast swathes of our lives, what happens to democratic processes that rely on the ability to ask questions like: whose decision? in whose interest? for what end? Kelleher highlights one particularly prescient examples of the legal challenges that deep learning presents: "Recital 71 of the General Data Protection Regulations (GDPR) states that individuals, affected by a decision made by an automated decision-making process, have the right to an explanation with regards to how the decision was reached."[700] New legal frameworks designed to regulate the world of big data, such as the EU's GDPR, in some respects lag behind cutting-edge research, in terms of regulating capabilities of new technologies (as would be expected). At the same time, however, the regulatory frameworks like GDPR are ahead of our capacity to fully understand the technological processes we are implementing.

In response to this problem, there is a growing field of research into the interpretability of deep learning networks. Some approaches to interpretability include feature visualisation,[701] attribution,[702] and dimensionality reduction.[703] Other approaches opt for more user-friendly interfaces focusing on a HCI approach in the design of working methods.[704] These techniques are methods of translation intended to extract semantic data from the machinic world to transfer it into a human semantic sphere. For example, the visualisation of a specific unit in a neural net to translate an abstract representation of a feature into an image that makes sense to a human.[705] However, the properties of the feature, as they exist as a state of the unit, are lost when translated into visual language. While these properties are perhaps abstract and quasi-formalizable (e.g. diagonal line intersection at *n* degrees), they may still have a degree of ambiguity vis-a-vis human interpretation. Furthermore, visualisation only works when a feature is locally stored in a unit, rather than as a relational dynamic in a distributed representation, because the latter are sub-symbolic, and therefore not discrete representational units but rather relational and processual (as discussed in Part II).

[699] Lipton, 2018, p.13.
[700] Kelleher, 2019, p.245.
[701] Olah, Mordvintsev, and Schubert, 2017; Erhan, *et al.*, 2009; Zeiler and Fergus, 2014.
[702] Sundararajan, Taly, and Yan, 2017.
[703] Maaten and Hinton, 2008.
[704] Strobelt *et al.*, 2018.
[705] Szegedy *et al.*, 2014. See also below discussion of Burrell, 2016.

In other cases, attempts are being made to translate machinic decisions into natural language. Ehsan *et al.* trained a neural network on the verbal rationalisations of gameplay decisions by human agents playing the 1980s game *Frogger*. This network was then used to provide rationalisations of gameplay decision by another neural network that had been trained to play the game.[706] Ultimately however, this is no more than a descriptive technique rather than a genuine explanation of the actual logic involved in the decisions being made by the machine. The humanness of the natural language grammar used obfuscates the underlying differences of human and machine decision-making. This sort of translation may be effective for the stated aims of the research, which is to produce "a natural language explanation for agent behavior *as if a human had performed the behavior*", but post-hoc interpretability of this sort is misleading and ambiguous.[707] While sufficient for relatively simple problem spaces like the gameplay mechanics of an arcade game, it is inadequate for interpretability of more complex and high-risk tasks.

Despite all these attempts, the extent to which computational opacity can be overcome is limited by the non-human quality of computation. Burrell supports this argument in her critique of proposals for code and algorithm audits.[708] Burrell undertakes an empirical analysis of algorithmic auditing by implementing several methods to see how well they aid in the process of reverse engineering the computational logic behind classification decisions. In one example, she demonstrates that a human semantic analysis of spam emails does not intuitively match the statistical patterns the algorithm discovers in spam, and therefore breaking down the highest weighted words in the spam classifier does not render legible "how the machine 'thinks'".[709] This is because the concept of "spam email" to the spam classifier is a statistical pattern that exists as a distributed representation emerging from a set of relations present when the model is processing an email.[710] A static, atomised view of the weighted words therefore provides very little insight into the machinic signification 'spam email'. Burrell's notes that her interpretation of what the machine was "thinking" was still all too human and therefore left ambiguities, such as why innocuous words like "visit" and "want" were key to the detection of spam.[711] Transferring this same method for algorithmic auditing to other classification cases in which algorithmic discrimination is more serious, this ambiguity undermines the ability to fully critique, and hold to account, computationally-driven decision-making systems. This situation is exacerbated the more complex the task, as human intuition completely fails in a high-dimensional problem space of the

[706] Ehsan *et al.* 2019.
[707] *Ibid.,* p.264 [emphasis in original].
[708] Burrell, 2016.
[709] Burrell, 2016, p.8–9.
[710] The reader may recall the argument in Chapter Five that distributed representation is a mode by which machinic signification is instituted and in turn obscured from human discernment.
[711] *Ibid.*, p.9.

kind common in machine learning.[712] The ambiguity of machinic signification haunts any attempt to fully understand it, producing a feeling of the weird and eerie when encountering structural effects of machine learning.[713]

Furthermore, the notion of interpretability is itself ambiguous. Zachary C. Lipton has provided a meta-analysis of the discourse of interpretability in machine learning, which problematises the concept as lacking in terminological rigour. Lipton argues that within the machine learning literature, 'interpretability' is defined by a range of criteria that are not necessarily describing the same thing, such as trust, causality, transferability, informativeness, how fair and ethical the decision-making is, or if there is transparency in terms of simulatability, decomposability (if each part of the model admits intuitive explanation), or algorithmic transparency. In other cases, the measure of interpretability is in post-hoc explanation, for instance, in natural language, or through visualisations of learned representations and models.[714] In each of these cases, those building machine learning models may be diligently attending to the interpretability of the model or process, while opacity continues to shroud other aspects.

In between the micro level of individual models and the macro level of large-scale machine ecologies, there is the opacity of software and automated decision making that non-expert users interact with in a day-to-day context. This layer can be broken down into two subcategories of opacity, one derived from the lack of technical literacy of the general user, the other being intentional obfuscation—whether for proprietary reasons, for effective functioning (such as in the case of anti-spambot detection),[715] or to intentionally avoid accountability and regulation.[716] These two forms of opacity often overlap: for example, an application for a loan may be rejected by an automated system without explanation. The algorithm nor the data used to reach said decision are rarely open to scrutiny by the applicant, which also obstructs recourse to appeal. In this manner, the obfuscation of bureaucratic systems is automated and intensified: Kafka-become-computational. When data and code *are* made publicly available, the capacity for the

[712] Domingos, 2012, p.78.
[713] See Fisher (2016) on the "weird" and the "eerie". Ambiguity is particularly present in machine learning and interactive computation because it has a necessarily empirical dimension non-existent in a closed computational loop that is simply a functional transformation of input to output. Machine learning requires a degree of leniency in terms of the fitness of a function. A model will approximate a solution, but the complexity of the problem space will determine the degree of ambiguity in any given function being the best fit. Real-world data arriving in real time may throw up limit cases and anomalies that do not fit the model. The interactivity of contemporary computing is open to the contingency of the outside of the computer. The machinic imaginary has a temporal existence that imports an indeterminacy which further undermines attempts to interpret and describe it. See also Fuller (2014), who extends this idea in a discussion of ambiguity in the experiential dimension of mathematics and computing.
[714] In a related paper, Lipton and his colleague Jacob Steinhardt (2019) argue that interpretability is a "suitcase word" that so many meanings that the term loses analytical significance.
[715] Sandvig *et al.*, 2014, p.9.
[716] Pasquale, 2015, p.2.

average user without technical knowledge to understand how these result in certain outputs remains limited (to say nothing of the above-mentioned difficulties even those with expert-level knowledge face when interpreting the results of machine learning).[717]

Another approach to combat opacity is the proposal for the study of AI systems through the paradigm of machine behaviour.[718] This is a different approach to the computer science literature on interpretability, which is largely focused on the stage of design and implementation. An interdisciplinary, mixed-methods approach, machine behaviour research draws on expertise from those who design and engineer AI systems, alongside social scientists:

> scholars of machine behaviour spend considerable effort in defining measures of micro and macro-outcomes to answer broad questions such as how these algorithms behave in different environments and whether human interactions with algorithms alter societal outcomes. Randomized experiments, observational inference, and population-based descriptive statistics—methods that are often used in quantitative behavioural sciences—must be central to the study of machine behaviour.[719]

The interdisciplinarity of machine behaviour seems to be the most reasonable to engage in any praxis of world articulation seeking to respond to the alienating tendency of the machinic imaginary. While machinic signification is necessarily unintelligible, its effects can be discerned in social-historical dynamics. The above suggestion of an open responsivity to the alien could be supported by methodologies like the study of machine behaviour, as a means by which to attend carefully to the traces of the machinic imaginary (the question of praxis is considered in the next chapter).

In sum, the question of intelligibility of different modalities of the social imaginary is undermined by a mutual opacity. The opacity of the machine in terms of human interpretability, and the opacity of the aspects of the human world not (yet) rendered legible to the computer. The drive for mutual intelligibility, the desire to overcome this alienation functions as an underlying dynamic reorganising social activity. In large part, due to the relative inflexibility of computational reason (it is more constrained by its basis in logic gates than the human psyche and social norms), this reorganisation tends in the direction of the machinic order, with the restructuring of space, human behaviour, sociality, and institutional organisation to fold them into the regime of calculability. The inverse impulse can, however, also be read in attempts at the

[717] *Cf.* Vee, 2017, for a critical discussion of coding literacy.
[718] Influenced by Herbert Simon's (1996 [1969]) classic text "Sciences of the Artificial", which proposes an empirical study of computers.
[719] Rahwan *et al.*, 2019, p.479.

humanisation of machines. On a superficial level, recognition might be understood as giving a human voice or face to a robot, but this ignores the underlying (inhuman) logics at its core (not to mention the implicit biases in any simulated image of a human). More serious attempts to render machine learning legible and interpretable are underway, with a range of voices from computer science, policy makers, and critical algorithm studies making the case for transparency.[720] While there are a range of interpretability techniques being designed and implemented in machine learning infrastructure, at the same time there is a counter-tendency of increasing dimensionality and complexity involved in machine learning techniques, which are further compounded by other factors of opacity, of which large-scale ecological dynamics are the most complex and unpredictable. Barriers to mutual intelligibility therefore remain, and my argument is that there is a certain layer of the machinic imaginary that will necessarily remain forever opaque and alien. The closest to which any understanding might occur is still subject to a form of translation, which is always fraught with slippage and semantic misalignment. As computational systems and machine learning penetrate ever deeper into social life, this situation has the potential to become even further exacerbated.

Chapter Eight is concerned with the political dimension of this situation. By way of moving towards a general conclusion to the thesis, this final chapter considers the concept of transsubjectivity, and returns to the initial questions about the political, building on the considerations above. As outlined at the start of this current chapter, the social imaginary is a transsubjective field of multiple orders, each a different phenomenological world. These worlds overlap and interact in many instances, but there is a degree to which these worlds are different in kind because of the logical-aesthetic ordering by which they are articulated. These phenomenologically distinct worlds express different regions of being-for-itself, which maintain a degree of self-finality, making them ontologically distinct. Thus, the ontological proposition of post-phenomenology that phenomenological worlds are expressions of being, each of which an ontologically distinct region with its own rules and structures of determination. The 'whole', which the myriad expressions of being compose, is an open, non-unitary generic magma, articulated by distinct regions of being-for-itself like the social-historical field of becoming. Each of these regions are in turn themselves open, non-unitary magmas, expressed multiply by other magmas of human and machinic imaginaries. Thus there are transversal relations between world articulations, such the transsubjective articulation of the social-historical, but they are nevertheless incommensurable. This is the structure of the alienation created by the emergence of the machinic imaginary within the social-historical: the machinic imaginary is an order that

[720] Sandvig *et al.*, 2014.; Goodman, Bryce, and Flaxman, 2017.

cannot be apprehended within human experience. Social-historical effects of this alienation add to the *pathos* of contemporary computational society—anxiety, confusion, paranoia, disenfranchisement, and detachment from participation in social-historical creation—further compounding and augmenting pre-existing structures of oppression and disenfranchisement. A contemporary critical praxis of reflective articulation must therefore work against negation and nihilism with a recognition of the limitations of the perspective of the singular. Reflective articulation must strive towards the impossibility of a transsubjective perspective, and the ethics of responsivity is one possible mode by which to do so. The next chapter will therefore return to this concept of responsivity and the political dimensions of transsubjectivity to present a praxis of computational society.

Chapter Eight: Transsubjectivity and Praxis

In her book, *Negativity and Politics,* Diana Coole provides the following definition of politics:

> Politics is primarily […] the domain of *collective life.* As such it concerns the shared institutions, rules, customs, values and practices that facilitate coexistence. Equally, however, it is about the strife, the unruly processes and normative disagreement that the engendering and imposition of such power structures entails. While the consensus and conflict involved in collective life are partially formalised in a domain defined as the political, its legitimacy and effects are under continual negotiation at all levels of intersubjective life, so politics is practised here, too. This negotiation renders politics an unstable, dynamic process; one whose strategies and contingencies may be constrained, but never wholly contained, by the more formal institutions of the political which are therefore themselves in process.[721]

This description of politics is well suited to a post-phenomenological framework committed to a pluralist social ontology, considering individuation of the social imaginary is animated by ongoing contestation of meaning and the institution of norms. Coole goes on to write: "precisely because the political is the domain of collective life, it necessarily engenders, and indeed requires, shared practices, habits, norms, languages, no matter how diverse its participants."[722] By these terms, however, does a theory of a machinic imaginary suggest a limitation of politics? Does the machinic imaginary constitute a zone within the production of the social in which there is an impossibility of politics because there is an impossibility of collectivity in terms of shared language, an impossibility of a shared grammar of the social, an impossibility of a shared articulation of the world? The conjecture of the machinic imaginary is that the social imaginary is radically self-differentiating, and human experience within computational society is fundamentally alienated. If so, is there a technopolitics that attends to the inherent alienation of the transsubjective character of the social imaginary that includes its machinic dimension? In light of the machinic imaginary hypothesis, how does the question of praxis become reconfigured? To reiterate a question from Chapter One: what sort of action oriented towards changing society is possible if the very terms by which meaning and thought are produced (i.e. the social imaginary) have become automated? It is to such questions I will now turn by way of some final thoughts, gathering together everything that has come thus far.

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[721] Coole, 2000, p.7.
[722] *Ibid.,* p.9.

An answer might be assembled with the aid of various sources that seek to develop a politics that is rooted in a pluralistic ontology. The politics found in Balibar's reading of Spinoza through Simondon's concept of the transindividual, and expanded upon by Jason Read, are the closest aligned to the current task. Jean-Luc Nancy's reformulation of community, in *Being Singular Plural*, which does not rely on individual subjectivity also offers helpful conceptual tools. As mentioned in the previous chapter, feminist and new materialist philosophy, such as the work of Haraway or Barad tread a similar groove, as does much of decolonial philosophy, especially that associated with the ontological turn in anthropology working on multi-perspectivalism. The work of these thinkers adds valuable insights into this matter concerning the various political implications of pluralism. The post-phenomenological problematic of computation and world articulation I am presenting here is aligned with these varied yet complementary bodies of literature. A detailed dialogue between such approaches and a post-phenomenological politics of transsubjectivity would be a productive approach, but is unfortunately beyond the scope of this thesis. Instead, my focus is limited to laying the necessary groundwork for a future conceptual development of this kind. By presenting the problematic of the machinic imaginary, I have hopefully demonstrated why there is a need for a concept of political (trans)subjectivity of reflective articulation adequate for the task of interrogating the particularities of computational society. While a full elucidation of such a politics cannot be fleshed out here, I will nevertheless provide an outline of what this may look like within the post-phenomenological terms I have developed.

In Chapter One I critiqued the technopolitics of the literature on computational society, arguing that there is a theoretical overdetermination of governmentality that reinscribes sovereignty into technology and limits the range of responses to the contemporary mediatic condition. In surveying the literature of technopolitics, one of the key texts I discussed was *The Cybernetic Hypothesis*. In that text, Tiqqun's strategy of exit is predicated upon a reading of cybernetic technology as a self-reinforcing, recursive spiral towards a singular point—which others have called the singularity.[723] This recursivity of the social imaginary is not disputed, its machinic dimension institutes itself through a recursive bootstrapping (being-for-itself), and there is a clear tendency towards, and desire for, global synchronisation.[724] However, there is a self-differentiation of the social imaginary due to the disparate modes by which the social world is expressed. The multi-logical character of the social imaginary can also be understood as multi-centred, where the recursivity of social-historical becoming is always drawing on an outside of

[723] Kurzweil, 2006.
[724] See Hui, 2019, p.226ff; On synchronisation see also: Stiegler, 2011.

itself. Exit is possibly an option, but it is not the *only* option. The reorganisation of computational society along a different trajectory not captured by the logic of cybernetic capitalism is possible through an interrogation of the institutions of the social imaginary that reinforce the latter.[725] My proposition is that there also needs to be a consideration of meaning and signification as a political site of contestation within the techno-political discourse, as this is overlooked in the emphasis on governmentality. A supplement to the governmentality discourse is expressed in the politics of the imagination and reflective disclosure, such as that proposed by Castoriadis and Kompridis. The task of this thesis has been to explore the parameters within which world articulation as *praxis* can be an effective reflective act at the level of the social.[726] Read's proposal that we need "to turn our attention to the production of subjectivity", is the same argument made by Kompridis or Castoriadis—albeit using slightly different terminology.[727] The theory of the machinic imaginary is an attempt to attend to the production of subjectivity (to use Read's word) in terms of how this is affected by developments in computer science and its applications. This ultimately leads, in my view, to the philosophically pessimistic conclusion that the articulation of the common is always going to be an alienating experience because of the alienness of computational expression of the world. Thus, the proposition of the existence of a machinic imaginary serves as a *problematisation* of the terms by which Kompridis presents reflective disclosure as a programme of critique as politics. To render the process by which the social world is articulated as a political site of contestation and interrogation, the theory of world articulation needed updating to account for the transsubjective character of the social imaginary including computational forms of worlding. However, this in turn highlights the withdrawal of machinic signification from human experience, therefore looping back through the original proposition of a reflective articulation to discover a new problematic.

This withdrawal also presents a problem for Castoriadis' project within the terms he understands it; namely, that the social imaginary is a human creation and therefore entirely available to human elucidation. Elucidation is of course not possible from the position of any given social individual, but *as a society*; Castoriadis argues that social praxis can achieve a form of autonomy by which society is fully reflexively aware in its practices of auto-institution. The effectiveness of reflective

[725] Moreover, unless exit happens as a single event—the probability of which is close to zero barring a global catastrophic event—then a practice of reflective articulation is still needed prior to any exit (a state of 'permanent revolution', as it were).

[726] A note on praxis: a politics adequate to the task within contemporary computational society is one which can traverse action and abstraction. The institution of the machinic imaginary is theoretical and practical reason enfolded into one another in the operations of computational infrastructure. As with all social doing, it necessarily involves a practical dimension, but of equal importance are the abstractions by which such social doing institutes significations. I use the term *praxis* here to denote the role of abstraction (theoretical reason) as it unfolds in the practical.

[727] *Ibid.,* p.130.

articulation as an intentional praxis, however, is dependent on the degree to which the myriad expressions of world that make up social doing can be rendered legible from the transsubjective positioning of the political community attempting to undertake said reflective articulation. The political subject, so to speak, is therefore society itself. Social imaginary significations, by definition, only have or make any sense within a *trans*subjective field. Social signification is a relational concept to describe the manner in which social doing expresses a world. However, there are multiple modes by which signification is created, each mode determinate of a different ordering (defined by logical-aesthetic capacities, as per Chapter Four).

The transsubjective character of signification also applies to machinic signification. To recap: local significations of individual agents interacting with the environment are subjective subtendencies constituting the material of social doing, and only become instituted as significations through interaction—coming into relation—with the transsubjective social field. I have attempted to demonstrate how learning in machines produces proto-significations, which can be described as subjective subtendencies because they are vectors of meaning that resolve into a metastable process of individuation at the social-historical level. Individuation of the social-historical occurs as these local (pre-individual) patterns find resolution in social doing; if they are not already compatible, any problematics arising from conflicting local patterns are resolved at a higher order of complexity. These tensions are what produce the dynamic effects that occur in large-scale socio-technical infrastructures. Signification as social doing cannot therefore be reduced to any individual instance but rather is the transsubjective relation between different articulations of the world interacting.[728]

The transsubjective character of social imaginary institution means that reflective articulation undertaken from any single subjective position (of an individual or a group) is always partial and incomplete. Genuine reflective articulation of the social-historical must therefore, be transsubjective in character. Certainly, the necessarily transsubjective condition of the social imaginary means that Castoriadis' concept of autonomy was already open to this critique as a bounded, relational concept prior to the emergence of the machinic imaginary: autonomy is determined by the phenomenological conditions within which one is positioned. It is determined so because the capacity to think propositionally about the organisation of the social world—and the reflective and deliberative activity required to meaningfully organise the world according to such propositions—must take place within a phenomenological horizon (an order determined by logical-aesthetic affordances). Castoriadis argued that autonomy was possible through a

[728] Furthermore, the social-historical has a recursive structure because it is serves as the context within which further signification and social doing takes place.

realisation of the auto-institution of society (i.e. there is no extra-social determination). This implies that determination is never totalising; the social imaginary institution of society is itself historical and non-identical with itself, in a constant process of (re)institution. The auto-poetic being-for-itself of society therefore resists total determination, acting as a 'groundless ground' for further elaboration.[729] The auto-institution of society is a self-differentiating process to the extent that the auto- is in a constant state of composition and decomposition. This becoming other to itself unfolds along diachronic and synchronic axes as myriad subjective subtendencies articulate the world in myriad ways, resolving into a metastability at the transsubjective level.

Any notion of autonomy must be understood within this matrix of self-differentiation, meaning that there can only ever be a partial capacity for reflective articulation. The onto-phenomenological self-differentiation of the social imaginary conditions the capacity of propositional thinking, as well as deliberative social activity according with those propositions, both of which are required for a truly autonomous society to flourish. The historical character of this self-differentiation means that the social imaginary requires constant reinterpretation, yet the machinic imaginary only serves to deepen the difficulty of the task of elucidation of social institution because it implies a certain impossibility of interpretation of the latter. The machinic dimension of the social imaginary eludes human experience. Any questioning is a questioning of that from which one is fundamentally alienated. Accordingly, a responsive post-phenomenology is here proposed as a possible first stage in engaging with this alienation and starting from the recognition of the fragmentary, multi-logical character of social existence. [730]

Coinciding with this line of reason, Yuk Hui suggests encouraging and leveraging 'fragmentation".[731] A focus on the different ways in which human-technical articulations of the world differentiate (which he calls "cosmotechnics"), demonstrates that techne is not a universal condition, but a contingent cultural and historical institution.[732] Hui notes that there is a dominant transhumanist ideology which believes in and desires the eventual culmination of technology in the singularity that will "take charge of state affairs and replace governments."[733] To the extent that it is captured by capital, there undoubtedly is a tendency of what he calls the "organising inorganic" towards totalisation and determination. Nevertheless, as I have attempted

[729] Balibar, following Foucault and Derrida, supports this when he writes that the transindividual has as a "quasi-transcendental" function in philosophy and politics. Foucault's rendering of the quasi-transcendental is as a 'historical *a-priori*' contaminated by the empirical (which is in turn influenced by Jean Cavaillès' philosophy of the historical contingency and internal necessity of mathematics). Derrida's interpretation of this concept is of the dual conditions of possibility and impossibility that produces the uncertainty of thought and forms of life. (Balibar, 2020, p.183)
[730] Waldenfels, 2011.
[731] Hui, 2019, p.294–299.
[732] Hui, 2016b.
[733] Hui and Crevoisier, 2020.

to argue, there is also an internal dynamic of self-differentiation of the social imaginary that creates an unstable process pregnant with possibilities. Hui concurs and favours an emphasis on fragmentation by emphasising locally-situated interpretations of technics. His concept of "cosmotechnics" describes the fragmented character of technology as it is expressed in relation to different cosmic and moral orders, across history and geography.[734] He points out that despite a unifying logic in the design of a technology, its implementation is always affected by local context, be that cultural or environmental.

As I argued in Chapter Six, the machinic imaginary is a metabolisation of the social, it is thus differentially distributed according to its social-cultural distribution. Even within what is a largely homogonous European cosmotechnics, someone from the UK can still get on a train in France and get a sense of the different expression of that technological form: there is definite sense that the train infrastructure is the product of a different aesthetic and political genealogy. Outside Europe—for instance in China as Hui describes in *The Question Concerning Technology in China*—the local expression of technology as it has developed in relation to cultural forms, moral and social norms, and political context, is different again.[735] The different cultural expressions of technology play out online too: an English-speaking internet user might assume that there is a homogenous culture online. Yet this is not the case both in intent of use, production, and reception of content, the interpretation of what internet technology is and what it can do, nor the local political forces that regulate and shape the internet of a particular region.[736] However, Hui does not see this as a radical enough differentiation, and argues that it is less a genuine transformation than a translation of Western modernity's hegemonic technology producing equivalences between cultures. Instead, a practice of leveraging and accentuating divergences in technological practices is needed to form genuinely novel cosmotechnics.[737] In this he is correct: there is a colonial homogenisation of the Silicon Valley image of technology spread by globalisation.[738] Therefore, to the extent that the machinic imaginary is an example of a tendency of differentiation of the imaginary even within more homogenous cultural-technological contexts, attending to the dynamic character of the machinic and normative dimensions of the social imaginary is a possible route to the production of genuinely novel forms of life.

[734] Hui defines cosmotechnics as "the unification between the cosmic order and the moral order through technical activities". Hui, 2016b, p.19.
[735] Hui, 2016b.
[736] Fraser, 2016.
[737] Hui and Crevoisier, 2020.
[738] Although it is worth remembering Arjun Appadurai's (1990) argument that with globalisation there is an ongoing tension between homogenisation and heterogenisation.

However, while illustrative of the fragmentary character of the social imaginary, the machinic imaginary also complicates the task of articulating a different world. The interpretation of the social imaginary as a human-technical mode of articulation can only really be understood from a transsubjective perspective, social-historical institution operates through myriad expressions held together without unity of identity (a more-than-unity without the law of excluded middle).[739] A transsubjective perspective is of course by definition a transversal relation across subjective perspectives. Such a pluralist social ontology therefore implies some degree of individual alienation from the transsubjective field, but as I alluded to in the previous chapter, such alienation can be understood in a positive light as generative of an inquisitive attitude that serves as a foundation for reflective articulation. Responsivity is a phenomenological attitude open to elucidation of the social-historical that starts from a recognition of the myriad ways of reinterpreting the world—including the particularly alien dimension of technology—and works through pluralist, collective engagement. With responsivity, a pluralistic attitude embraces the presence of the alien. This alien presence becomes an event to which a response can be given in reinventing the answer to that question of who 'we' are as a collective.[740]

When I first introduced the idea of an apparently fundamental alienation of machinic reality from human experience, I posed this as a different form of alienation from that which Simondon argues is inherent to the separation of culture and technics:

> Culture has constituted itself as a defence system against technics; yet this defence presents itself as a defence of man, and presumes that technical objects do not contain a human reality within them. […] The most powerful cause of alienation in the contemporary world resides in this misunderstanding [caused] by its absence from the world of significations, and its omission from the table of values and concepts that make up culture.[741]

With the emergence of a machinic imaginary, the "world of significations" is injected with machinic significations. The "table of values and concepts that make up culture" now includes those with computational origin. This does not resolve the alienation of which Simondon speaks, it in fact doubles it. His is a different problematic to what I am proposing: that this table of

[739] What Castoriadis calls a "magma" (1987, p.340ff). Simondon's (2020, p.4) analogy of supersaturation explains this well: "In order to think individuation, we must consider being not as substance or matter or form, but as a tense, supersaturated system above the level of unity, as not merely consisting in itself, and as unable to be thought adequately by means of the principle of the excluded middle; the concrete being or complete being, i.e. pre-individual being, is a being that is more than a unity."
[740] In Hui, 2018, pp.226–230, he sketches the outlines of the concept of 'sensibility' of the 'inhuman' that resonates with the notion of responsivity of the alien as I am using it here.
[741] Simondon, 2017, pp.15–16.

values and concepts extends into non-human dimensions. However, understanding the incomprehensibility of machinic significations within human experience as a form of alienation in the negative sense, would be to repeat the categorical error of thinking subjectivity as a model of ego-centric subjectivity. In reorienting the analysis to the transsubjective, the negative connotation of this alienation (as negation) is replaced with a positive (in the mathematical sense of additive) connotation of pluralisation. From the perspective of the politics of transsubjectivity the *problem* of alienation resolves into a metaphysical predicate that subjectivity is always caught up in a current of subjective subtendencies and processes beyond one's comprehension and control. It turns out that responsivity to *this* form of alienation—which is a fundamental relational quality of social-historical existence—is a way to overcome the alienation of which Simondon speaks. To argue for a human reality within technical objects—their participation in the "world of signification" and "the table of values and concepts that make up culture"—is not to reassert an extension of the human into technical objects, but rather to recognise that there is a shared participation in the construction and evolution of culture. To genuinely accept this mutual participation of the non-human within culture, it is a prerequisite that one must reinterpret culture as a transsubjective process. This is in fact precisely what Simondon does with his concept of the transindividual. As Jason Read notes, Simondon's concept of the transindividual offers "a fundamental challenge to two cherished precepts of contemporary ideology and common sense: the presupposition of the individual as a fundamental starting point for ontological, social, and political thought, and the opposition between individuality and collectivity."[742] While Read develops this in dialogue with Marxism to draw out its political implications, Simondon's thesis of the transindividual can also be developed into a politics understood in post-phenomenological terms, emphasising the problems of poly-regionality and considering the consequent ethical dimension through responsivity.

Read argues that "transindividuality constitutes a new orientation in thinking about both economics and politics, focusing less on the idea of a collective or individual subject for politics than on the processes by which political subjects, and more importantly political pressures, are constituted and destroyed."[743] In this vein, the theory of the machinic imaginary adds a further conceptual tool for understanding the specificities of computational media as part of those processes by which political subjects and political pressures are constituted and destroyed. I have presented computational media through the unlikely lens of subjectivity because the analytical focus was on how meaning is produced and maintained in society. Considering my theorisation

[742] Read, 2016, p.6.
[743] Read, 2016, p.16.

of the machinic imaginary, it is not enough to simply analyse the individual as an always-already integral dynamic within the articulation of transsubjective field. Crucially, the latter partially constitutes the former in a way that is fundamentally opaque and requires translation between scales and across orders (as discussed in Chapter Seven), thus presenting a further analytical challenge. Take for example, Read's proposal for a politics of the transindividual, which he uses to defend the idea of the production of subjectivity as a common:

> The problem is how to make the common, the transindividual and preindividual conditions of subjectivity, something other than the inchoate backdrop of experience, to make it something actively grasped, so that subjects can transform their conditions rather than simply be formed by them.[744]

This problem, which he correctly diagnoses, is describing reflective articulation, and is compounded by the opacity of the machinic imaginary. Read suggests that the task of politics today is "a matter of articulating this common, the unrepresentable transindividual collectivity, against the conditions and practices that conceal it."[745] But reclaiming the production of subjectivity as a common is thwarted by the machinic imaginary, which obfuscates the processes of subjectivity production. It turns out that the common of which Read speaks is inhuman: still common but unrecognisable. The machinic imaginary partially conceals the common in such a manner that eludes full elucidation. The responsive phenomenology of the alien is a way to navigate this impasse and *create* a common.

To address the problematic of the alien presence of the machinic imaginary requires a responsivity to its abstractions, and an attention to the diffuse effects of its subterranean force upon social-historical dynamics. Reflective articulation of the sort Castoriadis argues is required for autonomy must involve a responsivity to the alien imaginary expressed by machines. Autonomy therefore requires an openness to difference and incommunicability. Responsivity is a mutuality beyond the space of communication, situated at the twilight zone between orders, where sense and non-sense are reversible depending on which side of the border one is situated. Receptivity and openness are required to discern those moments when signification crosses the threshold into order. Waldenfels speaks of responsivity in the following terms: "Can we think of nothing else along the boundaries of orders but an antithesis…? An alternative would be the return to a *self-reference within the reference to the alien,* a responsivity that allows for the inevitability of

[744] Read, 2010, p.121.
[745] *Ibid.,* p.130.

demands to be combined with the invention of our own answers."[746] His ethics of responsivity can be understood paradoxically as that of incorporating the demands of the alien: the impossibility of incorporation of the alien is a means by which to *begin a praxis of world articulation*. This alien dimension within the social imaginary is a prompt to rethink what it means to be human within computational society, such open responsivity, and the work of maintaining it, is a practice of commoning. Understanding social existence from this starting point is an opportunity for *inventiveness as response to alienation*. The field of machine behaviour referenced above is an intriguing proposal in this regard because it might be figured as a systematisation of responsivity. To do so, it must attend to the alien trances of machinic signification within a social-historical context pervaded by the machinic imaginary. Furthermore, it must incorporate any insights gained into a social, economic, political, and cultural theory that can inform a praxis of being human in that same social-historical context.

Thus, to conclude this brief discussion of the political implications of the machinic imaginary, the latter presents an opportunity for a *responsive praxis*. The basic premise of this praxis of rearticulation of the world is founded in an ongoing critique and elucidation of a transsubjective world. The theorisation of the machinic imaginary I have presented is my attempt at discovering the *generative* limits of this praxis. Through this elucidation new problematics have been uncovered that both require further elucidation (the interrogation of the world is, necessarily, an ongoing process) while also defining the limits of said elucidation. These limits demarcate the path to take as they define what space of action is and is not available.

Nevertheless, the most concrete conclusion that I think can be taken from the thesis of the machinic imaginary is, at least in part, a philosophically pessimistic one, or rather an affirmation of negativity: *there is a fundamental alienation produced by the historical development of computational reason.* While the machinic imaginary supplements the growing literature on the co-implication of humans and other modes of existence of non-human beings, it also highlights the unbridgeable existential distance between them in terms of what worlds are expressed. The positive lesson to take from this is that human imaginaries are not axiologically definitive. Even between human communities, reality is expressed in different ways; what is of value finds expression in each approach to life. Beyond human imaginaries, the world also has value but in ways which will not make sense from within any human imaginary. This is a conclusion that many have come to, as Couze Venn summarises:

[746] Waldenfels, 2004, p.85.

> research across a diversity of sciences, say in biology, critical psychology, quantum physics, radical ecology, radical anthropology and cognate sciences, and some perspectives in the neuro and cognitive sciences, are increasingly framed by approaches that emphasise relationality, co-emergence, co-constitution, complexity, cooperation, that is, they assert the co-implication of all beings in a world in common. Together they suggest new ways of grounding ontology, epistemology and ethics, and thus new points of departure for rethinking the relation of being and knowing, being and acting. They thus provide appropriate grounds for inventing ways of living compatible with postcapitalist societies, that is, compatible with a cosmopolitical project aligned with a politics of the common.[747]

The machinic imaginary thesis at once both reiterates this position, while also highlighting the difficulties of this co-implication as concerns the autonomy of human communities to organise and reinterpret the world when there is a process of institution of the *nomos* that is uncontrollable in its lack of interpretability. Other beings with which we share the earth are usually, in this discourse, understood through an ethical framework of care; humans having an unequal degree of power to destroy or cultivate life on earth therefore emphasises the ethical duty to be placed upon human societies. As, Haraway writes:

> human beings are not the only important actors in the Chthulucene, with all other beings able simply to react. The order is reknitted: human beings are with and of the earth, and the biotic and abiotic powers of this earth are the main story. However, the doings of situated, actual human beings matter. It matters with which ways of living and dying we cast our lot rather than others. It matters not just to human beings, but also to those many critters across taxa which and whom we have subjected to exterminations, extinctions, genocides, and prospects of futurelessness. Like it or not, we are in the string figure game of caring for and with precarious worldings made terribly more precarious by fossil-burning man making new fossils as rapidly as possible in orgies of the Anthropocene and Capitalocene.[748]

On one hand, computing technologies afford new capacities for care.[749] Yet on the other, computational infrastructures with increasing capacity to make and remake the world according to their own logic are running away from the ability of humans to control, which makes the "game of caring" for more precarious worldings an even more difficult charge. The task of

[747] Venn, 2018, p.127.
[748] Haraway, 2016, p.55.
[749] Gabrys, 2016.

reflective articulation is complicated by the transsubjective character of social-historical being, particularly as concerns its machinic dimension. The degree to which reflective articulation is unable to comprehend and intervene in the institution of machinic significations, especially to the degree that machinic institution is captured by the forces of capital, only serves to compound the already existing problems for which thinkers like Castoriadis were proposing a revolutionary praxis to fight against.

The role of a praxis of responsivity must therefore be an ongoing reflective interrogation of the institution of society that understands the latter through the lens of transsubjectivity. Reflective interrogation must proceed through a responsivity to the effects of the machinic imaginary. With the machinic imaginary there is a pre-reflective disclosure that is partly obscured by the alien reason of the machinic, the abstractions created by the latter—machinic significations— by definition cannot be received as such. Nevertheless, the philosophical core of praxis involves attending to the abstractions produced by practical activity (signification). Responsivity is in the very least about attending to the traces of machinic signification and the large-scale historical effects of the machinic imaginary. This perhaps requires accepting that interaction between the orders of human and machinic worlds can only happen at a distance, through an inadequate translation. If nothing else, an open and curious receptivity to the alien machinic abstractions that cohere around social doing in computational society is the challenge that arises.

Conclusion

The recursive structure of the thesis has entailed an integrative series of theoretical claims, concepts, questions, and problematics. Each part builds on that which preceded it, reapplying prior propositions and conceptual tools to elucidate further problematics. This structural design is intended to mimic the recursive ontogenetic structure of machinic becoming as described, and in that way to also performatively implement the post-phenomenological commitment to ontological expression. That is to say, the thesis is structured to represent a thought *process*. Rather than a static text that purports to represent thought as something already taken place prior to writing, the aim is instead to foreground the expressive movement of thinking—in this instance illustrating the transformation of my thinking over the course of a few years. Nevertheless, for reasons of clarity, if not convention, the following conclusion breaks this flow and takes a moment of stillness and reflection to capture what has taken place in the preceding pages.

Contribution to knowledge

The core contribution of this research is the proposition that there is a machinic dimension of the social imaginary, which I have termed 'The Machinic Imaginary'. I explore the implications of this primary speculative thesis as it pertains to the phenomenology of technology and a critique of contemporary computational society. In doing so, I construct a theoretical framework, and present a series of problematics deriving from the machinic imaginary. While Part III motions towards an ethics of responsivity and a politics of transsubjectivity, it does not provide a concrete programme or general political theory, as that is not the purpose of this thesis. It is not intended to provide any solutions, but rather a set of political and existential *problematics*. The abstract notion of the problematic serves a structural function in the unfolding of the argument and will continue to animate future work in which I try to untangle the broader problematics encountered in Part III. The extent to which the initial concerns change over the course of the thesis can be summarised according to the propositions and problematics set out and carried forward from each Part.

Part I set out an initial dual problematic which defined the research aims: a critical problematic concerning the changing character of the political in computational society, and a methodological problematic of how to proceed analytically. Chapter One sets out the political problematic, defined by the reduction of computational media to cybernetic governance and control and an overly voluntaristic politics of imagination that does not adequately engage with the being of technology. The core proposition here is that a reflective praxis of world

articulation can provide a model of a politics of the imagination incorporating technology as a mode of world articulation. How to do so is the primary question and problematic from Chapter One.

Chapter Two, in setting the methodological problematic, asks: what is a post-phenomenology of technology? A critique of contemporary instances of phenomenology of technology highlights the insistent centrality of the human in each instance surveyed; even when ostensibly intended otherwise, anthropocentrism sneaks in through the back door, thus the need for a post-phenomenology that can avoid this return to human experience.

Chapter Three constructs a post-phenomenology that allows me to address the tensions of the previous chapters. Major thematics of the thesis are explored in detail: the problem of the world and the limit of phenomenology as key to post-phenomenological investigation, as well as the presentation of a theoretical framework for a world articulation that includes non-human imaginaries (i.e. a pluralist, multi-logical theory of world articulation). Integrating the tensions of the previous chapters, the core problematic subsequently taken up in Part II is how this framework—constructed from the literature as it was—can be applied to computation, i.e. what does a post-phenomenology of technology look like?

Part II therefore seeks to enact a post-phenomenological analysis of computational society. Chapter Four advances a post-phenomenology of technology with an initial theoretical definition of the machinic imaginary. This includes further development and introduction of several key concepts: social imaginary signification and social doing/activity; machinic signification; ur-signification; information; theory of the image; being-for-itself; poly-regionality; and the function of logic-aesthetic in the determination of world. The following chapters put these concepts into practice. Beyond the need to illustrate the theory with specific examples, unresolved tensions from this chapter integrated in the following chapters are: that machinic signification is of a different order to human social imaginary significations; and that the post-phenomenological proposition of a poly-regional ontology has the consequence of a fragmentation and divergence of the social imaginary.

Chapter Five considers the historical emergence of the machinic imaginary, arguing that learning functions afford machines the capacity to order the world according to their own idiosyncratic logic-aesthetic, and that subsequent patterns of social activity driven by learning machines are subjective-subtendencies which become instituted as machinic significations. The contribution of this chapter is to highlight the opacity of machinic signification derived from the technical process of learning in machines, which is integrated into the argument of Part III. Chapter Six

then considers how the machinic imaginary is, furthermore, a product of the interactive computing paradigm and social embeddedness of computing, providing the context for machine learning to participate in a social activity and the reproduction of social life. The large-scale machine ecologies and emergent dynamics that follow from the interactive paradigm are considered, concluding that the machinic imaginary is self-grounding (a region of being-for-itself). Accordingly, the key carry-forward problematic concerns the implications of the complex dynamics of interaction and divergence of the machinic imaginary with broader processes of social imaginary institution at the level of social-historical transindividuation.

The thesis culminates in Part III, with a synthesis of the carry-forward problematics and propositions into a further set of problematics and questions for future research. Chapter Seven considers previously-established notions of fragmentation, pluralism, and poly-regional ontology, and introduces the idea of an ethics of responsivity. The problematic constructed in this chapter concerns the pathos of the machinic imaginary and the dual problem of opacity and interpretability as the site of a novel form of alienation. Finally, Chapter Eight extends this problematic by looping back to the critical problematic initiated in Chapter One: resolving into an interrogation of the transsubjective conditions of a political and critical project (praxis) of reflective articulation, and the political implications of the machinic imaginary as a novel form of existential and political alienation.

Cumulatively, the above constitutes the 'general problematic' of the machinic imaginary, summarised in the following set of conclusions. The machinic imaginary is a region of being-for-itself distinct from the human dimension of the social imaginary, determined by phenomenological difference in the expression of world (its unique logic-aesthetic). The horizon of human experience is non-identical to the horizon of experience of the social-historical world, which is post-human (it arguably always was, but it now has a machinic dimension): there is a bifurcated machinic imaginary within the social imaginary. This bifurcation means that the social imaginary is alienated from itself. Moreover, this post-human existential analytic is defined by an alienation of human experience from the transsubjective field of social-historical becoming. The capacity to re-imagine or rearticulate the social world and social institutions is consequently undermined and limited by the machinic imaginary; therefore this alienation is political insofar as it is existential.

Ultimately, this thesis is an opening to future thought, an attempt to lay the groundwork for an ongoing theoretical development of a critical project of reflective articulation by elucidating the transsubjective character of the social imaginary in light of the machinic imaginary as *limit*. This

limit is the source of an existential alienation produced by the emergence of the machinic imaginary within the social-historical. This limit is arguably the most important conclusion in the final analysis because it defines the parameters of any elucidation of the social imaginary. That there is a fundamental limit to the interrogation of the institution of society is the pessimistic existential analytic proposed by the machinic imaginary thesis.

Existential pessimism need not equal political apathy, however. Certainly, the existential analytic tempers political struggle because it reduces the capacity for enacting change to an ever-smaller range. It is tempting to reject such a pessimistic conclusion; nevertheless, simply because a conclusion is inconvenient does not mean it can or should be rejected as false. Rather the existential pessimism of the theory of the machinic imaginary is intended to refine the techno-political analysis and moderate the excesses of the politics of imagination by bringing into sharper focus the difficulties and limitations of the political in computational culture. Of course, alienating structures of existence and forces of disenfranchisement pre-date the computational technologies that are the concern of this thesis. Indeed, the former were preconditions of these technologies, and if nothing else, the machinic imaginary is an intensification of pre-established forms of power, discrimination, and control. Nonetheless, my argument is that there is a genuine difference in the structure of alienation produced by the machinic imaginary that must be included in any analysis of computational society. This pessimism need not, however, be read as nihilistic. Instead, in the face of increasing alienation we must still struggle for a better world, and to do so we need to keep our tools sharp.

With this in mind, the critical aim of the machinic imaginary thesis is to explore and define the parameters of a praxis of reflective articulation in computational society. This is an attempt to bridge thematic approaches in the literature: on the one hand, the 'technopolitics' emerging from the critique of technology; and on the other, the 'politics of imagination' emerging from utopian currents in political theory and cultural critique. Both have their merits, but also certain shortcomings that the other addresses. In the literature surveyed, techno-political critique tended to equate technology with governance and control, and therefore a determination of the social, cultural, and political that reduces or negates the capacity for an active shaping of alternatives. Within this model, the political is reduced to reaction, either to the contingent event of the technological accident or glitch, or a complete rejection of existing technology in calls for sabotage and exit. In contrast, the politics of imagination is typically a more social determinist position, in which technology is discussed as a tool of either domination or resistance (largely because the politics of the imagination is a cultural critique, of norms and values, which posits ways of living and being otherwise in distinction to current conditions). More technologically-

focused critical imaginaries, like accelerationism and xenofeminism, embrace the utopian possibilities of technology, synthesising the technological critique with a politics of imagination by proposing to dismantle the master's house with the master's tools (in a reversal of Audre Lorde's famous dictum).[750] However, the question of the being of technology remains secondary, if considered at all.

In attending to the being of technology, my own more pessimistic conclusions point towards fundamental political limitations of the imagination wrought by the existential condition of computational society. In contradistinction to techno-optimism, I have attempted to explore a synthesis of the *negation* of both the politics of the imagination and the technopolitics of cybernetic control. I argue that technology *actively* participates in the politics of the imagination *qua* the social imaginary, and in doing so becomes a site of alienation for the human condition in computational society (lemma: the creative imaginary is the origination of heteronomy as much as it has a capacity for autonomy). The machinic imaginary is an active participation in social imaginary institution insofar as it is a generative expression of *techne* that exceeds its human dimension. Yes, there is a co-constitution of the human and technology, and I concur with the thesis of original technicity;[751] however, there is also a degree to which the technical systems humans have built express an ontological excess of a genuinely non-human modality, participating in their own region of being. Hence the existential pessimism of my conclusions in Part III: human existence is co-extensive with technical existence (Simondon), yet fundamentally alienated from technical existence in its fullest expression. Therefore, human existence is alienated from a dimension of itself.

The machinic being-for-itself only begins to decouple from the human as it begins to develop a capacity to articulate a world for-itself. This capacity of the machine is a historically novel evolution of reason, arising from the synthesis of theoretical reason (*legein*) and practical reason (*teukhein*) in the modern computer. The ability for machines to act according to a determination that they themselves construct (according to their own machinic logic) constitutes the emergence of a new mode of environmental interaction that expresses a world for-itself. I have tentatively called this a logic-aesthetics, to emphasise the logical specificities of machinic *aesthesis* (and vice-versa) and engage with a multi-logical (or multi-modal) description of aesthetic modalities that articulate a world for-themselves. As an abstract model, these aesthetic modalities map onto the regions or modes of being described by Castoriadis and Simondon: physical, vital/biological, psychic, social individual, collective, [technological], and social-historical/transindividual.

[750] Laboria Cuboniks, 2018.; Lorde, 2018.
[751] Beardsworth, 1998.

To explore and defend this theoretical position, however, requires the construction of an analytical framework for such a line of reasoning. Therefore, the second major contribution of this thesis is the development of a post-phenomenology adequate to the task of describing and critiquing the machinic dimension of the social imaginary as a more-than-human creative expression of the social world. The core concern of this post-phenomenology is the process of world articulation. With this comes the corollary ontology of expression drawn from Merleau-Ponty, and Castoriadis' radicalisation of ontological expression in the form of the auto-poetic institution of the social imaginary, unfolding into the pluralist, poly-regional ontology of both Castoriadis and Simondon. Within such a framework, however, further work was required to justify the argument that computation is another region of being-for-itself to the extent that it is a creative expression of world articulation. While the ontological character of world articulation—as an aesthetic relation with an environment—is present in Merleau-Ponty, Castoriadis, and Simondon, the extension of this idea to computational technology is absent (albeit arguably partially present in Simondon). I argue that within this post-phenomenological framework are the conceptual conditions for an extension of world articulation to the computational, thus allowing for a reasonable case to be made for computational world articulation. Concepts of expression (Merleau-Ponty), information (Simondon), signification (Castoriadis), and the more general theoretical structure and ontological commitments of their work can apply to computational technology, especially as it has evolved through the field of machine learning and the latter's role in social doing. Thus, through a post-phenomenological analysis of machine learning and computational infrastructures, not only is a novel analysis of the machinic dimension of social imaginary institution possible, but the very framework of post-phenomenology is itself developed. In this way, while the initial reading of the literature highlights a post-phenomenological trajectory from Merleau-Ponty through to Castoriadis, Simondon and others (Árnason, Adams, and Waldenfels), this thesis provides a further original elucidation of the post-phenomenological in application to a critique of computational society and the elaboration of the machinic imaginary thesis. With this exploration of the post-phenomenological literature, I have attempted to contribute to scholarship on Merleau-Ponty, Simondon, and most of all Castoriadis. On a more personal note, more than anything else I have gained from writing this thesis, my thinking has evolved most definitively from the sustained engagement with these thinkers and the framework of post-phenomenology developed in Part I.

Early in the thesis, in Chapter One, I posed the initial question of what becomes of the phenomenological notion of 'world' in light of twenty-first-century technology, and, furthermore, to what extent it is analytically correct to describe the social imaginary of

computational culture as a single unified imaginary. In the application of the post-phenomenological framework to these questions concerning computational society, I argued that the social imaginary must be understood from a pluralist perspective, and that there is not a unitary social world but a fragmented, multi-logical articulation of worlds that overlap and interact but also differentiate and diverge. This, in turn, uncovered of a new problematic and line of post-phenomenological inquiry that carried through this thesis and, I am sure, will extend beyond it in future work I undertake.

World articulation, Nonknowledge, Alienation

In the introduction, I wrote that a central concern of this thesis is the process of world articulation, focusing on how world articulation is multiple and differentiated, while co-implicated in a transsubjective world. The parameters of this research are within the transsubjective social-historical world, narrowing the discussion to social ontology rather than a broader scope of general ontology (to the extent that social ontology can be distinguished from general ontology). Specifically, this thesis is concerned with the effects of machinic world articulation on the institution of the social imaginary, and therefore on the political conditions of possibility within which a critical praxis of world articulation can take place. The invention of learning in machines, I argue, is a novel mode of world articulation with its own non-human logics and aesthetics. The consequence of this argument is that the degree to which the machinic imaginary is a constitutive dimension of the transsubjective process of social-historical institution, is the degree to which human understanding is alienated from the latter. In other words, if the social world is partially determined according to an incomprehensible machinic logic-aesthetic, the social imaginary as the field of social signification begins to fragment and is incomprehensible from any perspective whatsoever. The cognitive and affective experience of this fragmentation is the experience of nonsense and nonknowledge. Bataille's writing on the latter sums up the pathos of nonknowledge:

> I have done everything to know what is knowable and I have looked for that which is unformulatable in my depths. I myself am in a world I recognize as profoundly inaccessible to me: in all the ties that I sought to bind it with, I still don't know what I can conquer, and I remain in a kind of despair. […] This is the position of someone who doesn't know what is in the locked trunk, the trunk there is no possibility of opening. […] Uneasiness experienced as well, the persistent uneasiness of one who searches for knowledge. Faced with nonknowledge, I experienced the feeling of performing in a

comedy, of having a kind of weakness in my position.[752]

The machinic imaginary exceeds human comprehension, it is excess social signification that has such an affective quality precisely because it can never be known. The nonknowledge of what lays in the "locked truck" is the black box of the machinic imaginary of which "there is no possibility of opening". Machinic signification remains always beyond our grasp, always impersonal and alien yet pervading the most mundane and personal dimensions of social life. The pathos of the machinic imaginary affects us transversally, in the imperceptible movements of historical becoming, or the sudden shock of unpredictable events, or in the gradual sedimentation of norms and behavioural patterns, the origins of which seem untraceable, incomplete, or fragmentary. Why is there cultural shift in a certain direction? Why has a given idea, sentiment, or pattern of activity arisen or proliferated? The usual analytical tools may provide answers but there may also remain a trace of the unknowable that the model cannot explain, this is the limit of the knowable: the machinic imaginary.

This excess nonknowledge is, however, that which drives further elucidation of the existential conditions of social life. As demonstrated by the Bataille quote written in 1951, nonknowledge does not only emerge contemporaneously, but finds its expression at different points in history. Nor does the concept only describe the excess of machinic signification. Rather the latter is an intensification and enlargement of the existential conditions that create nonknowledge.[753] Nonknowledge is that which remains elusive and thus elicits interrogation; therefore, the question of computation re-establishes philosophical reflection vis-à-vis a new source of nonknowledge. Human existence within computational society creates new demands of philosophy. For instance, what does the alienation of the machinic imaginary mean for the concept of the human as it relates to a social imaginary of which it is both constitutive and separate? Furthermore, how does this relate to other forms of existential alienation, such as the alienation of racialised black experience described by Fanon?[754]

In initiating such reflection, this thesis addresses the extent to which the computational dimension of the social requires a reconsideration of the political and existential models previously predicated on human modes of reasoning and imagining—as typified by Castoriadis' notion of autonomy and Kompridis' reflective disclosure. While concrete answers on how to

[752] Bataille, 2001, pp.113–115.
[753] David Beer (2023, p.110) concurs, and even argues that the desire to expand nonknowledge is the central aspiration of machine learning research.
[754] Fanon, 2008. Ramon Amaro's recent work *The Black Technical Object* (2022) is an example of a philosophical reflection on similar questions, albeit in a perhaps more optimistic direction, arguing that "it is through machine learning that we might gain new methods to liberate Black psychic generation from negating forms of power" (p.34).

undertake a critical project of reflective articulation in computational society remain undetermined, Part III offers a provisional model with which to proceed. Chapter Seven proposes an ethics of responsivity, and Chapter Eight turns to transsubjectivity as a key concept for understanding the ontological commons conditioning political subjectivity. The concept of transsubjectivity highlights a mutual participation in the construction and evolution of culture by various modes of being and the respective subjective subtendencies that emerge within them. Thus transsubjectivity is a crucial concept for a politics faithful to the multi-logical, poly-regional ontology drawn out from my reading of post-phenomenology. Responsivity is a derivative concept in this regard, as it is an ethics of poly-regionality, beginning from an attention to the insurmountable alienness of different logical-aesthetic orderings of the world (regions of being).

The historical condition of transsubjectivity—the extent to which politics has always taken place within a transsubjective field—is a much broader question that I have not considered. Nevertheless, the emergence of the machinic imaginary as a distinct mode of institution of the social-historical does have a clear historical contingency tied to the development of computational technologies, the self-constitution of learning in machines, and their large-scale infrastructural dynamics. The transsubjective character of contemporary computational society means that the social imaginary produces and maintains the possibility of the institution of the machinic imaginary within history, with the social imaginary becoming, in part, historically contingent upon the dynamics of its machinic dimension. This produces a self-determining condition in which the machinic imaginary is both contingent upon its broader social-historical institution, while at the same time creating its own conditions. This can be reformulated as the argument that the machinic imaginary is a being-for-itself in that it constitutes its own ground. An engagement with the transsubjective always involves a determining, a bringing into (an) order. The multiple orders co-present in the transsubjective field can only be brought into view through further determination, negating alterity by identifying difference with(in) a particular order. Thus, while human experience is immanent to a social imaginary that includes a machinic dimension, it can only ever engage with that machinic dimension as the alien, from without, unless it translates the machinic into a human register, whereby the machinic is stripped of that which makes it radically alien. While to a degree the machinic imaginary is susceptible to certain techniques of investigation, such as computer science, software studies, or machine behaviourism, as a mode of being-for-itself it ultimately escapes elucidation from without. When considered at the transsubjective level of the social-historical there is no sense of interiority or exteriority. From any particular subject-position of a (human) individual—the standard predicate of the autonomous individual as a singularity that is relatively positioned—or even a collective,

the view of the transsubjective is always necessarily limited by perspective. As Read notes, any representation of the transsubjective entails a closure, a determination, and thus always a *partial* image of the open field of the transsubjective condition.[755]

Any critical project of reflective articulation is limited by its phenomenological character and perspective (its necessary singularity) and the logical-aesthetic mode of determination (sense conditioning sense-making). Reflective articulation therefore finds a clear home in micropolitics,[756] in the embodied, affective, and local dimensions of experience, and the quotidian dimension of social imaginary institution. The transsubjective field is the condition of the micropolitical but the former is also created by the latter. An ethics of responsivity therefore integrates the transsubjective character of the micropolitical into a critical reflection about the world, and highlights the topological relation between diverse micropolitical instances of social activity (and hegemonic macropolitical forces). This includes the subjective subtendencies of machinic signification produced by learning machines, which are, by definition, beyond the horizon of human experience, and therefore beyond the reach of reflection. Reflective articulation responsive to the alien is therefore catalysed by nonknowledge and alienation. Not, however, in the positive sense that it turns alienation against itself, but rather that the alien elicits a response by the negation of experience that shrouds it. Chapter Seven discusses possible ways the alien might produce a destructive and nihilistic response, as much as it can be an impetus for a generative articulation. Crucially, these are not mutually exclusive categories, even a nihilistic attitude is a form of world articulation—world articulation is not a choice, it is rather the degree of critical reflexivity involved in one's participation in social-historical creation. Responsivity is not passive and reactive; it is an active *interpretation*, just as a conversation is both an expressive process and a creative act of interpretation. Thus, a critical project of reflective articulation adequate for contemporary computational society is a reflective articulation responsive to the machinic dimension of the social imaginary. The machinic imaginary is, however, experienced as limit, rebounding critical reflection upon itself. Moreover, the machinic bifurcation of the social imaginary is exemplary of a broader pluralist ontology that maintains the necessity of limit. Hence the importance of micropolitics in attending the knowable with a view to every micropolitical instance as integrative in the transsubjective process of social-historical creation. Nevertheless, this limitation is still a loss: a loss of autonomy, and a loss of some degree of ability to determine the political and social-historical conditions of our existence. That it elicits further reflection and elucidation should not be read as a consolation. Rather, elucidation and critical

[755] Read, 2010, p. 122.
[756] Deleuze and Guattari, 1987, p.208ff.; Guattari, 2016, p.74ff.

reflection become even more urgent and necessary to leverage the remnants of autonomy that remain in dwindling reserve. The machinic imaginary is an existential assault on autonomy alongside those pre-existing forces of heteronomy that undermine self-determination.

Confronted with such limitations, on what does a critical project of reflective articulation concentrate if it is to attend to the machinic imaginary? Chapter One asked what sort of praxis might be conceived if there is a machinic imaginary; that is, what sort of action oriented towards changing society is possible if the very terms by which meaning and thought are produced (i.e. the social imaginary) have become automated? The answer I have given is that action towards changing society is still possible, but the increasing role of the machinic imaginary equates a diminishing capacity to comprehend and therefore participate in social imaginary institution. This is not to say the machinic imaginary is unanalysable, *tout court*. Certainly, many phenomena seem elusive until an appropriate methodology is found: the right tool or technique for disassembly, deconstruction, and analysis. However, as with any process of analysis this requires an abstraction and transformation: physicists may be able to study quantum particles, but this is at a high degree of abstraction, and the object of study is constructed by the instruments and mathematical models deployed. The machinic imaginary remains elusive, but its pathos and the effects it enacts in social-historical institution can be studied.

Crucially, moreover, the machinic imaginary is not solely composed of machinic significations entirely divorced from social imaginary significations; machinic significations are a species of social imaginary signification and therefore share many properties. It must be remembered that the machinic imaginary is a metabolisation of the social and therefore also comprises the sedimentation of pre-existing social significations. These can be categorised into five key formations: repetition, coding/design, operation, systematic disposition, and majoritarian entrainment. There is a *repetition* of the same, due to the role of data in the process of machinic signification. While the processing of data by machines transforms the input to an extent, the old adage 'Garbage In, Garbage Out' (GIGO) still pertains. The sort of data used in machine learning is a core, defining parameter of the eventual properties of machinic significations. Input data is further affected by two other social variables: what is deliberately *coded* into the data, and the systematic disposition of software in the *design* process (to what end the model has been built will impact how it processes data). As argued in Chapter Six, machine learning takes place within society, it is a form of social activity, whether that is in the social context of software design, or in the live environment of 'online'/'incremental' machine learning. Therefore attention to the

operation of machines within wider assemblages (for example, racialising assemblages)[757] is vital when attending to the possible variations and properties of machinic signification and its effects. Even if machinic significations remain invisible as such, understanding the context of their circulation is a crucial critical practice of responsivity. An extension of the operation of software within wider assemblages of power is the *systematic disposition* of society towards using the software to various ends (for example, in the service of racist ends flowing out of and constitutive of racialising assemblages). A responsivity towards the machinic imaginary must also include a sense of the *entrainment* of the machinic imaginary to majoritarian perspectives. All the above forms of sedimentation participate in the entrainment of the machinic imaginary, which is why a micropolitical approach is crucial in addressing the mundane, molecular level involved in the construction of the technologies, as well as the practices that make up the large-scale machine ecologies within which machinic signification circulates and activates. Social doing (as the wellspring of social imaginary institution) must include the caretaking of abstractions that constitute computational reasoning. The algorithms, models, and data that go into the machine are the first site of interaction with the machinic imaginary. Nonetheless, all this is still action from afar, the activity of learning machines and their interaction on a large scale transforms these abstractions into a form that obscures our direct intervention. The effects of the machinic imaginary must therefore be attended to through a careful vigilance of the subtle effects that it has at a structural level, while also considering the micropolitical dimension of human social activity in the formation of the machinic imaginary.

The implications of the machinic imaginary are subtle and, by definition, unrecognisable. The machinic imaginary is a creation of computational society seeing itself: as see-er it is also seen, by humans and machines. But as much as that vision is reversable, so too it implies an invisibility—we can never see ourselves from the perspective of the other who we see and who sees us. As Merleau-Ponty describes, this invisibility is the interiority of the other that cannot be seen: just as I have an interiority that the other cannot see, so the other, the object to my subject gazes back at me, mirrors my seeing, we are both visible to one another while there is also an invisible remainder that persists. That invisible remainder is the vision that sees me.[758] In this way, the machinic imaginary is the invisible remainder of social-historical institution. However, this discontinuity is generative and constitutive. The self-bounding of world articulation reinforces the alien as that which does not find a place within the articulated. An act of expression is entailed in attempting to reach outside the already articulated and determine the latent invisible

[757] Weheliye, 2014.
[758] See Merleau-Ponty, 2003, and Merleau-Ponty, 1968.

texture of the for-itself of an alien order. Such an attempt is doomed to fail, for an invisibility (difference) will always remain, yet in striving to make the invisible visible, something new is articulated—this is the ontological dimension of expression: to create meaning where there is none is to bring something new into the world *ex nihilo*. While the alienation of the machinic imaginary might produce a nihilistic attitude in the face of nonknowledge, it is also an opportunity for the expressive defiance of reflective articulation. With adequate responsivity, a creative and critical effort to elucidate the mute and invisible world of the machinic imaginary may translate silence into *poíēsis*.

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