

ABSTRACT

SYLVIA IV, JOHN JOSEPH. *Posthuman Media Studies: An Affirmative Approach to Informational Ontology, Big Data, and Processes of Subjectivation*. (Under the direction of Dr. Stephen B. Crofts Wiley.)

The concept of information plays an increasingly important role in the work being done in a wide variety of fields, ranging from engineering and biology to communication and philosophy. Tiziana Terranova (2006) traces the development of this concept from its emergence in the 15th century to contemporary feminist critiques. Although cybernetic definitions of information have varied throughout different waves of cybernetic thinking, information has been identified as the predominant element of organization for systems. In molecular biology, information is seen as negentropic, which explains how systems retain their organization despite surrounding entropic forces. Finally, Terranova links this tendency to the identification of information with DNA. This shift makes information both hylomorphic because it contains form and matter, and neo-Platonic, because life is understood as the expression of a pattern which can be replicated in more than one medium. Through this connection, information has also come to be understood as a central concept that has pushed society past industrialization and into an “information society” that, arguably, renders traditional Marxist theory outdated (Bell 1976; Castells 1996). However, some present-day autonomous Marxists are rethinking Marxist theory for the Information Age around the concepts of immaterial labor, the general intellect, and a-signifying subjectivation (Hardt and Negri 2001, 2005, 2009; Berardi 2011b, 2015; Lazzarato 2014). These processes of subjectivation are the forces responsible for one’s construction as a subject. Despite these efforts, information has largely remained part of the discursive constructionism paradigm that was predominant in media and cultural studies throughout the 1990s. This paradigm is

focused narrowly on the role of discourse in human affairs and tended to downplay the role of information because it existed outside of signification. Other scholars have critiqued the discursive constructionist paradigm, outlining paths for analyzing materiality and affect (Grossberg 1992, 1995, 1997, 1999, 2010; Hayles 1999, Terranova 2006).

The project first demonstrates through a quantitative analysis that most contemporary approaches to information and big data operate within the resource doctrine of information—a problem-space that posits information as a thing that can be used (Ch. 2). Because critical theorists have largely tried to address the challenges associated with information from within the same doctrine, few solutions or alternatives have arisen, highlighting the need for an affirmative approach, understood as a process of counter-actualization that experiments with new forms of subjectivation (Ch. 3). Before developing this affirmative approach, it is important to consider how the concepts of *eidos* (form, information) and *tekhnē* (skill, technics, technique) have been understood in prior major philosophic systems through a genealogy of their uses. This genealogy demonstrates the way these concepts are understood significantly influences philosophic systems of ontology and epistemology (Ch. 4). Based on this analysis, this project argues that Foucault's understanding of technics as a technique of power opens the path to understanding the impact of technics on processes of subjectivation and influences developing notions of posthumanism (Ch. 5). Next, this project develops a materialist definition of information and explores affirmative approaches to both information and big data that focus on citizen science as a method of data generation and collection (Ch. 6). Drawing on Félix Guattari's mixed semiotics, the project develops an approach to using big data for generating experimental processes of subjectivation. (Ch. 7). The final chapter offers several methodological approaches that arise from the informational ontology

developed in this project. These approaches taken together, modulation, counter-memory, media genealogy, and critical making, form the core methods of an approach that I call Posthuman Media Studies (Ch. 8).

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Posthuman Media Studies: An Affirmative Approach to Big Data, Informational Ontology
and Processes of Subjectivation

by
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DEDICATION

To Lea, Athena, and Cora for sharing with me life's greatest gift – never letting a day pass without the joy of play.

BIOGRAPHY

J.J. Sylvia IV completed his B.A. degrees in Communication and Philosophy in his home state at Mississippi State University. During this time, he also created and coded an e-commerce site for a local furniture store, which he managed for seven years. While earning his M.A. in Philosophy from The University of Southern Mississippi, he developed his interest in the ethical implications of media such as television and the Internet. This interest led to his work with a nonprofit organization focused on helping schools impacted by Hurricane Katrina in Mississippi and Louisiana to better integrate educational technology. Through collaborations with sister programs in Mexico and Kenya, J.J. also helped develop a broader strategy for community-based job skills and technology training. Examples of this training included workshops for soon-to-be-released prisoners and community members who were displaced from their jobs by the Deepwater Horizon Oil Spill in the Gulf of Mexico in 2010.

The summer before J.J. began his Ph.D. in the Communication, Rhetoric, and Digital Media Program at North Carolina State University, Edward Snowden leaked top secret documents that revealed how the National Security Agency was collecting massive amounts of data. These revelations inspired J.J. to focus on the ethical and larger philosophical implications of big data. The challenges presented by big data led him to develop a posthuman approach to information and big data that he is expanding into methods for a broader approach to posthuman media studies.

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This dissertation project could not have been completed without the support, advice, and collaboration of my family, friends, and mentors. My four years in the Communication, Rhetoric, and Digital Media Program at North Carolina State University provided an invigorating environment that offered the perfect balance of nurture and challenge. I am grateful for the opportunities it offered to not only learn new skills such as critical making but also to meet, engage, and collaborate with other scholars from around the world through the CRDM Annual Symposium.

First, thanks to Dr. Steve Wiley for the steady navigation he provided through my doctoral work, extending from my very first night of classes through the completion of this dissertation. His friendship, intellectual guidance, and thoughtful, calming advice has helped push my scholarship into new and unexpected lines of flight. From Steve, I have learned what it means to be a true mentor and can only aspire to pay that forward to my own future students. My entire family is thankful for the welcoming and supportive environment he and Myriam have extended to us.

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simple question that knocks down a wall in my work that I had not yet even realized existed, affording an opening to new and exciting modes of thought (and unthought). This dissertation would not have been possible without Dr. Rosi Braidotti. Her summer course was the flashpoint for this project and her politics of affirmation continues to resonate through both my professional work and personal life. Dr. Andrew Johnston was always willing to help me think through new ideas and concepts as I worked through my exams and dissertation. Dr. Madhu Katti was kind enough to offer his input from the natural sciences as I thought about ways that citizen science approaches might be integrated into the social sciences and humanities.

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CHAPTER 1: The Affirmative Approach

“Affirmative ethics is not about the avoidance of pain, but rather about transcending the resignation and passivity that ensue from being hurt, lost and dispossessed. One has to become ethical, as opposed to applying moral rules and protocols as a form of self-protection.” – Rosi Braidotti 2011

What *is* information? What *is* big data? Though there is widespread agreement that we live in the Information Age, there is much less agreement about what information actually *is*, primarily because it has been defined in different ways in different fields of study and application. Over the centuries it has taken the shape of lectures, songs, the written word, secrets, music, paintings, files on a computer, or most recently big data. And yet, there remains a conundrum. On the one hand, information and big data offer an exciting new approach to engaging with and learning about the world around us as we create a knowledge-based society. At the same time, this information is often turned against us in the form of control and surveillance. How do we understand this conflict? Can it be resolved?

The concept of information plays an increasingly important role in the work being done in a wide variety of fields, ranging from engineering and biology to communication and philosophy. Tiziana Terranova (2006) traces the development of this concept from its emergence in the 15th century to contemporary feminist critiques. Although cybernetic definitions of information have varied throughout different waves of cybernetic thinking, information has been identified as the predominant element of organization for systems. In

molecular biology, information is seen as negentropic, which explains how systems retain their organization despite surrounding entropic forces. Finally, Terranova links this tendency to the identification of information with DNA. This shift makes information both hylomorphic because it contains form and matter, and neo-Platonic, because life is understood as the expression of a pattern which can be replicated in more than one medium. Through this connection, information has also come to be understood as a central concept that has pushed society past industrialization and into an “information society” that, arguably, renders traditional Marxist theory outdated (Bell 1976; Castells 1996). However, some present-day autonomous Marxists are rethinking Marxist theory for the Information Age around the concepts of immaterial labor, the general intellect, and a-signifying subjectivation (Hardt and Negri 2001, 2005, 2009; Berardi 2011b, 2015; Lazzarato 2014). These processes of subjectivation are the forces responsible for one’s construction as a subject. Despite these efforts, information has largely remained part of the discursive constructionism paradigm that was predominant in media and cultural studies throughout the 1990s. This paradigm is focused narrowly on the role of discourse in human affairs and tended to downplay the role of information because it existed outside of signification. Other scholars have critiqued the discursive constructionist paradigm, outlining paths for analyzing materiality and affect (Grossberg 1992, 1995, 1997, 1999, 2010; Hayles 1999, Terranova 2006).

In light of such critiques, my project develops a robust feminist material conceptualization of information. Terranova (2006) points to feminist criticisms of information, particularly by N. Katherine Hayles (1999), that have highlighted the negative

impacts of the disembodied conception of information, pointing to Gilbert Simondon's work on information as a potential alternative to this disembodiment. Because of the role of information as a new form of power in contemporary capitalist society, Terranova argues that such critiques and alternatives are "as important today as that of ideology and discourse was within modernity" (287). My project develops and explores the potential of this alternative understanding of information through a materialist ontology (Deleuze [1968] 1994; Deleuze and Guattari [1980] 1987), and specifically considers how information, and in particular big data, alter the processes of subjectivation. Additionally, following the philosophic work of thinkers such as Baruch Spinoza, Gilles Deleuze, and Rosi Braidotti, my material approach to information and big data will be affirmative, insisting on an ethics that transforms the negative into positive passions.

My interest in an affirmative approach to big data has in many ways grown out of my straddling of two very different worlds and approaches to data. I created, coded, designed, and subsequently managed an e-commerce site for just under a decade. In this role, I was responsible for collecting and analyzing data, which became increasingly easy with the launch of Google Analytics in 2005. Google Analytics made evaluating the effectiveness of multiple pages through A/B and multivariate testing easy, facilitating its use by even the smallest companies and organizations. From my perspective in this world of commerce, the use of data was vitally important and a means of increasing revenue. Yet, I also lived in the world of philosophy and critical theory – fields often critical of both media and capitalism. Working between these two perspectives, I first began to think about the ethically

problematic uses of data through A/B and multivariate testing when it was used to manipulate customers primarily to increase profits (Sylvia 2010).

At the same time, I was cautious not to be overly critical, aware that all new technologies are criticized harshly at the time of their invention – a tradition dating back at least to Socrates' critique of writing in the context of its effects on memory (Sylvia 2009). Therefore, I suggested that when data were used only to generate greater profits, it was manipulative and ethically problematic; however, there might be many other ways to use data that avoid these problems. Yet, with the rise of big data, and especially after the 2013 leaks by Edward Snowden that showed the NSA was broadly collecting data on all United States citizens, the divide in attitudes toward big data between businesses and critical theorists has grown vast. I can easily access my email and pull up two separate emails representing these vastly different approaches. One features the an issue of the trade magazine *Internet Retailer*, which highlights new strategies for leveraging big data to increase profits. Another includes an update from danah boyd's *Data & Society*, with an article that features a critique of the way that racism can be coded into policing algorithms. I began to realize that neither of these perspectives fully accounted for my approach to big data.

Although I saw problems with the way businesses and governments were using such data, I was also able to imagine potentially agreeable uses of big data not aimed only at profit. Happily, there have been an increasing number of approaches that aim to use big data for social good, but what has remained lacking is a theoretical support for such an approach. How might data be theorized outside of the frameworks of profit or surveillance?

The answer to this question requires a deep exploration of posthuman philosophy. Our relationship with technology, and more broadly the craftsmanship of *technē*, has a long and complex history that dates back to the foundations of Western philosophy. The way we understand this relationship affects the way we can know things about the world around us as well as what it even means to be human. Further, it connects closely with how we understand the basic ontological nature of reality: is it based on eternal unchanging Forms or is it always in-formation, always in flux and always becoming something different? Understanding information and big data and the role that they play in our contemporary society requires a careful evaluation of our answers to these deeper epistemological and ontological questions.

By understanding how different philosophical systems have answered these questions, as well as how such answers have altered our epistemological and ontological commitments, I argue that we can better elaborate a new ontological concept of information. This informational ontology combines Gilbert Simondon's concept of information with the ontology of Gilles Deleuze to elaborate a process of individuation/differentiation and *agencement* – the construction of assemblages. This process creates a metastable entity that is always open to further individuation. This eliminates any notion of a unitary nature of the subject or individual, and embraces a posthuman understanding of the human as non-unitary. Without an essence to fall back on it will become important to understand the processes of subjectivation that structure our metastable states, and these processes can best be understood through combining Michel Foucault's work on subjectivation in his lectures at the College of Paris and Félix Guattari's work on machinic assemblages. While Foucault helps us better

understand the role of technologies of the self in this process, Guattari is able to show how subjectivity arises from the process of individuation. By understanding this process, we can then better critically and creatively intervene in our own processes of subjectivation, especially through art understood in the context of modulation. Modulation is a necessary framework because it acknowledges the mutual relations and exertions of force between entities as they are in-formed in the process of assemblage.

Informational ontology also highlights the different scales of analysis available for assemblages. Historically, due at least in part to the over coding of language privileging the role of the human, the primary scale of analysis has been the human scale. I argue for expanding this analysis to both micro and macro scales that would take into account, for example, the microbiome as well as larger scales such as cities and planets. Processes of subjectivation also occur at each of these scales, and an informational ontology can help develop the tools to understand and analyze these processes as well. I will explore several examples, including citizen science, critical making, media genealogy, and counter-memory.

Lastly, we can connect this new conceptualization of information back to big data in order understand how it can affect our processes of subjectivation. Understood within the framework of an informational ontology, big data is a material trace of the interactions of various entities, including humans, with the real. When big data is understood as a material trace, it can be connected to a larger system of mixed semiotics, which extends beyond the realm of languages and, according to Guattari, offers the best path for experimenting with our processes of subjectivation. It further allows us to understand the role that big data can play

in larger cognitive assemblages that are explicated by N. Katherine Hayles (2016a, 2016b). This approach to big data lets us better understand how it can be leveraged in ways that escape the capitalist logics of control and surveillance.

My focus on a materialist ontology links this project to Rosi Braidotti's (2011b, 2013) work on posthumanism and nomadic theory, opening the possibility for affirmative and experimental approaches to subjectivation. This affirmative approach moves beyond criticism, embracing a nomadic Spinozan-based ethics that asks what a body can do. Braidotti's nomadic ethics is structured through ontological relationality, affectivity, and endurance, insisting on non-profit, open source, open access, and copy-left initiatives as means of affirmative qualitative transformations. These themes will be explored and elaborated throughout the project. My driving research project is to rethink information at the ontological level to generate new affirmative uses of technology, and big data specifically, in order to produce experimental new processes of subjectivation.

In Chapter 2, I use a literature review and a quantitative study to situate big data within contemporary popular, critical, and theoretical discourses, arguing that it exists within a problem space of information as a resource. Building on the work of Bryan Behrenshausen and Lawrence Grossberg (Behrenshausen 2016; Grossberg and Behrenshausen 2016), I argue that such a doctrine is problematic because it tends to restrict agency to traditional human individuals and artificially limit the ways that big data is conceptualized. In other words, when big data is understood primarily as a resource, we are most likely to think about it either in the context of how we can use it to generate profits or what the ethical critiques of

such an approach might be. Without an additional conceptual paradigm for big data, we seem to be stuck in a resource doctrine groove that limits the way we think about using big data. The types of issues most commonly addressed in literature on big data include the expansion of surveillance and the problems created by big data for privacy, but also include the potential for big data to be used beneficially through initiatives such as the aggregation of Quantified Self data for medical research and the construction of Smart Cities. While such beneficial uses of big data begin to extend past strictly for-profit motivations, they nonetheless remain within a resource doctrine of information.

I demonstrate the ubiquity of this resource doctrine of information using the detailed results of an empirical quantitative study of the ways that big data is visually depicted on the web. My analysis shows how these visualizations also draw on a resource-doctrine conceptualization of information, often representing it through metaphors such as oil, exhaust, and humans as resources. The results of my analysis confirm that, in addition to discussions within critical and cultural studies, popular representations of big data on the Internet depict information as a resource.

After situating big data within the resource doctrine of information, I explore in Chapter 3, the challenges created by such a conceptualization. As part of this exploration, I note the main approaches that critical mainstream theorists have used to understand these challenges associated with big data as it exists inside this doctrine. I argue that, while these approaches do an excellent job of highlighting and critiquing, they often struggle to offer suggestions for how to escape the deeper issues related to surveillance and control. One

example of this challenge can be seen through an application of Dallas Smythe's ([1981] 2012) framework of commodification. This framework is extended in order to demonstrate that while it can be used to critique big data, it ultimately does not offer solutions for overcoming the challenges which it identifies.

Next, I explore traditional and experimental approaches to privacy protection. For example, considering the Edward Snowden leaks of 2013, U.S. President Barack Obama called for an overview of big data and surveillance. The 2014 reports generated in response to this request foreground the importance of privacy – protected through both policy and technology – as a potential response to issues of commodification and surveillance. Secondary uses of data involve novel analyses of data that were not yet known or possible when the data was originally collected. However, I argue that the theoretical possibility of protecting privacy through traditional tools such as notice and consent and anonymization (Cate and Mayer-Schönberger 2013) are not possible while still maintaining the most valuable secondary use of big data. In other words, even when notice and consent is functioning at its best, it can only gain consent for primary uses of data that are already known. But many of the most beneficial uses of big data come from secondary uses. For example, this might include an analysis that connects two previously unrelated databases. Based on unresolved tensions such as this one, I highlight the need for an affirmative turn that draws on the work of Gilles Deleuze, specifically through its extension in the work of Rosi Braidotti. I argue that the frameworks of counter-actualization and posthumanism can offer an affirmative alternative to the resource doctrine of information. This affirmative

approach seeks to shift away from critique toward more active ethical political compositions (Wiley 2005) which embrace the relation to non-human forces and focus on the gradual co-creation of qualitative changes based on the ontology of relationality. It also emphasizes a new way of understanding the non-unity of a self-organizing subject and subjectivity as simply the effect of constant flows of in-between power connections (Deleuze [1968] 1990a). These power connections occur at both the macro and micro levels of the body, and are mostly induced by technology, blurring the boundaries between humans and machines at all levels.

Developing an alternative approach to the resource doctrine of information requires understanding how the concept of information has previously been deployed. Chapter 4 serves as an interlude between critiquing current concepts of information and developing a new feminist, materialist, posthuman concept of information. Additionally, this chapter argues that the concepts of information and technics are intimately connected with philosophical systems of metaphysics and epistemology that explain what it means to be a so-called human – so-called because the human subject has been decentered in the posthuman approach (Kittler [1999] 2010). Therefore, rethinking the concept of information will also be an important step in rethinking what the so-called human is from a posthuman perspective. The question of how to rethink the human has been widely debated in critical and cultural studies, with special emphasis on how technology and information flows impact this rethinking. For example, N. Katherine Hayles (1999) argues for a posthuman perspective that acknowledges the materiality of information, while Bernard Stiegler ([1994] 1998)

challenges the myth of an original, non-technological human. Although other projects (Capurro 2009; Peters 1988) have traced the development of information and technology through some philosophic systems, the relationship between the two concepts of *tekhnē* (technics) and *eidōs* (form, and later information) in major philosophic systems has not been explored in depth. This chapter offers a genealogy of these concepts through several major philosophic systems. I argue that the way one understands the relationship between *tekhnē* and *eidōs* creates the philosophic foundation for both epistemological and ontological conceptualizations of the human. By closely examining the genealogy of *tekhnē* and *eidōs*, such an analysis offers new possibilities for projects that aim to rethink the human. This genealogy includes conceptualizations of *tekhnē* and *eidōs* in the works of the Sophists, Socrates and Plato, Aristotle, Francis Bacon, René Descartes, David Hume, bureaucratic statistical systems and cybernetics, and Michel Foucault.

In Chapter 5, I build on earlier concepts to develop a new approach to information that opens up the possibility of thinking about information from the perspective of subjectivation rather than that of the resource doctrine. Extending Foucault's use of *tekhnē* analyzed in the previous chapter, I explore Foucault's later work on the processes of subjectivation. Foucault's understanding of technology of power expands over the course of his work, moving from a brief mention of the link between technology to *savoir* in the *Archeology of Knowledge* (1982) to his shift in his later lectures, beginning with *On the Government of the Living* (2016), which explore the way that subjects are established by their own self-care via processes of subjectivation. I extend Jeremy Packer's (2012) argument that media studies has

a central position to play in understanding processes of subjectivation, with a particular emphasis on media specificity. Scholars such as Stiegler ([1994] 1998) and Kittler ([1985] 1990) have demonstrated the importance of an a priori mediality in understanding the construction of the subject, with Kittler paying particular attention to how different discourse networks have influenced this construction. Here, I argue that, to build from such a perspective, the key to an affirmative approach would be to find media-specific methods of intervention and experimentation in processes of subjectivation.

I argue that, even without the level of access that governments and large corporations have, an individual can access and utilize big data to shape his or her own life toward a self-selected goal. While it is never possible for one to escape completely outside of the self that has been determined by the discourse networks and media epistemologies within which one exists, it is possible to understand how one's subjectivity is shaped and to experiment with new arrangements. This activity, this shaping of one's own life, is a form of provocation that takes place outside of discursive practices. In other words, one is not making a discursive argument about how others or even oneself *ought* to be living life, but rather creating one's own life as an art object as means of experiment and provocation. Such an active shaping of one's life offers a way to move beyond discourse to an opening up of a new potential for intervening in power and creating new avenues for programming one's future conduct. While an analysis of big data at the level of the individual offers new potential for intervening in power, I further argue that Foucault's work on processes of subjectivation serve as an important influence and precursor for posthuman theory, which broadens the understanding

of the concept of a subject and allows for an increased understanding of the role that media plays in processes of subjectivation.

To demonstrate this alternative approach, I examine the ways that two different social networks, Facebook and Ello, leverage processes of subjectivation as apparatuses of capture of desiring-production (Deleuze and Guattari [1972] 2009). To explore the possibility of intervening in one's own processes of subjectivation through Facebook, I share the results of my qualitative analysis of student work drawn from two undergraduate courses in media studies. Students reflected on their use of Facebook, while slowly building their understanding of how the site functions. This culminated with their accessing the ads topics that Facebook has associated with their account and critically and creatively intervening in the ways in which they have been subjectivated. A qualitative analysis of their responses and artistic interventions demonstrated the importance of three major themes: (1) students believed that the for-profit nature of Facebook leads it to subjectivate them in a shallow manner, understanding only small bits of information about them that can be useful for advertising. This subjectivation mirrors Deleuze's ([1990] 1995) concept of the "dividual." (2) The students are subjectivated by Facebook in a way that seems to be stuck on a "first impression" that was created when the students first started using the service, and thus now feels outdated. (3) By understanding how Facebook uses data about them, students felt more empowered to intervene in their own processes of subjectivation.

In contrast to Facebook, I consider the way that an alternative social networking site, Ello, has used data differently and how this alters processes of subjectivation. Ello was

selected as a contrast to Facebook because unlike other social networking alternatives, it was founded as a public benefit corporation. Ello allows users to opt-out of all data collection not inherently necessary for the site to function, such as the saving of posts that users have made. The site is also ad-free and does not make use of algorithms to display posts to users. While the site still collects and uses the data associated with the posts of users, its lack of advertising and algorithmic sorting of posts allows users more experimental input into their own processes of subjectivation. The processes of subjectivation associated with Facebook tend to be occur through very passive use of the site and are centered around the way one's data is collected and harnessed for advertising purposes. In contrast, the processes of subjectivation related to the use of Ello occur primarily through the ways that one opts to interact with the site and its various features rather than the way that their data is stored, used, and connected to other big data.

In Chapter 6, I fully develop an informational ontology that provides the framework for an embodied version of posthumanism that demonstrates the importance of exploring and experimenting with media-specific processes of subjectivation. This informational ontology is the theoretical center of the entire project and illuminates the philosophical concept of assemblage, which I consider at scales both smaller (microbiome) and larger (biopolis) than the so-called human. An informational ontology can also serve as a support for the latest scientific research, which is demonstrating that the concept of the individual, long important to the field of biology, no longer makes sense. Instead, biologists are beginning to understand the inherent interconnectedness of everything (Dunn 2016; Gilbert et al. 2012; Yong 2016).

This biological understanding links up well with Guattari's ([1989] 2008) ecosophical approach. Informational ontology replaces the essentialist concept of form with a dynamic process of in-formation as "the tension between two disparate realities," that "*emerges when a process of individuation reveals the dimension through which two disparate realities together become a system,*" (Simondon 1992, 311, emphasis original). This information drives the process of individuation, supports Deleuze's virtual/actual distinction, gives rise to differentiation, and drives the process of becoming by supporting the concept of assemblages that are always metastable and open to further individuation.

The link between information and assemblages also creates the possibility to analyze assemblages at multiple scales. Drawing on the work of Patrick Geddes, I argue that the city, or biopolis, serves as a macro-scale example of an assemblage (Geddes 1947; Welter 2002). In other words, if the microorganisms of the microbiome serve as an example of the interconnected assemblages of the so-called human at the micro-level, then the city can be understood as an assemblage composed of, among other things, a large number of so-called humans, buildings, and other objects at the macro level. This echoes Stephen B. Croft Wiley's (2005) argument that a human being is not just itself an assemblage but is also as part of a larger assemblage. Finally, Chapter 6 ends with an argument that a citizen science methodology, when expanded beyond the bounds of science proper, offers a method that works well with an informational ontology to understand the processes of subjectivation that occur at macro levels such as the city. Recent advances have made microsensors widely available in a way that can be leveraged to generate big data through collaborative efforts.

While such a process has the potential of creating messy and problematic data, these potentials align well with an informational ontology approach because they create noise and generate potential lines of flight, while allowing for dissident subjectivities that can generate new artistic approaches to processes of subjectivation that exist outside of the logics of capitalism (Guattari [1989] 2008; 2015).

In Chapter 7 I extend the concept of information to develop a new approach to big data as a material trace. In order to construct this alternative approach to big data, I will first explore the connections between the emerging field of biosemiotics (Favareau 2009; Hoffmeyer 2009), Guattari's ([1977] 1984) mixed semiotics, and Hayles' (2016a, 2016b) cognitive assemblage. Drawing on these three approaches, I argue for a machinic approach to a-signifying semiotics that, when understood as part of such a machinic assemblage, will further the ability to ethically and aesthetically experiment with one's own processes of subjectivation through the construction of an *artmachine* (Sauvanargues 2016) that functions through modulation. To clarify, modulation can serve as an alternative approach to *eidos* in which the continuous modulation of metastable entities is contrasted to the molding of already formed and separate individuals. Thus defined, we can now see how this approach to information offers an alternative to the ways that other philosophic systems have conceptualized *eidos*. Form can now be understood as arising through the reciprocal assumption of form between mold and material. Modulation also allows us to create an *artmachine*, a concept I develop to describe an aesthetic intervention in processes of subjectivation.

Though scientific and philosophical practices also offer revolutionary potential, it is art that offers the most opportunity for experimentation with processes of subjectivation, especially in light of the rise of big data. Next, in context of this modulation, I theorize a material approach to big data understood as a trace, which in the process of modulation, can feed-forward the data collected in order to help a particular assemblage better intervene in and experiment with its processes of subjectivation at multiple scales, escaping the control and surveillance of control society. Finally, I argue that such an assemblage can never be entirely predictive of the future because it is not limited to a closed system, but rather part of a radically open universe that is always in the process of becoming. Further, information is inherently unknowable (Chaitin 1999, 2012), always leaving open the possibility for lines of flight.

In the final chapter (Chapter 8), I lay out a preliminary vision of how informational ontology can offer a new metatheoretical position for the field of communication, which I call posthuman media studies. In short, a posthuman media studies offers a philosophic theory to the field of communication, that, most importantly, conceptualizes communication processes as modulation rather than transmission of data between already individuated entities. Modulation offers a way of thinking about communication without the need for an agent. In addition to this shift, I argue that several other methods can be connected closely to an informational ontology approach as part of posthuman media studies. Critical making offers such a methodology: it emphasizes a type of embodied making that recognizes the importance of materiality and a-signifying flows, and it offers a conception of craft as *tekhnē*

that aligns well with Deleuze and Guattari's work. This conceptualization enables us to experiment with a-signifying data flows that affect subjectivity and drive cultural mutations, especially in connection with practices of citizen science and open source movements.

Another method that becomes important in the context of informational ontology is a counter-memory approach in studying the processes of subjectivation. Avoiding ideology, this approach can highlight how media play a role not only in what is seeable and sayable, but what actually gets incorporated into historical canons and what instead dwells in silence. A posthuman media studies approach will consider how media can be leveraged to highlight counter-memories and construct counter-histories, as well as the impact this has on those who have been subjectivated largely through the dominant canonical history. This can be tied into a larger media genealogy that extends the already productive media archaeology approach.

In summary, I have argued that the challenges presented by the rise of big data cannot be met through the current problem-space of information as a resource or the associated legal and critical frameworks of privacy such as notice and consent and anonymization. In developing a new problem space – that of an informational ontology that drives the process of becoming – media studies is linked to processes of subjectivation. By understanding big data through this framework, rather than those of knowledge and power, one is able to develop critical and creative interventions that avoid capitalist capture and provide an escape from a society of control. Extending this framework opens up an alternative way to think about studying media, which emphasizes practices such as critical

making, citizen science, counter-memory, modulation, and media genealogies. I call this affirmative and experimental approach “Posthuman Media Studies,” because it foregrounds the importance of understanding the non-unitary nature of all individuals, instead drawing upon the richly developed philosophic concept of assemblages, grounded in an informational ontology that creates only metastable individuals, always in the processes of further becomings that are radically open to intervention through experimentation.

CHAPTER 2: The Human “Face” of Big Data

“Subjectivation is never without a black hole in which it lodges its consciousness, passion, and redundancies. Since all semiotics are mixed and strata come at least in twos, it should come as no surprise that a very special mechanism is situated at their intersection. Oddly enough, it is a face: the *white wall/black hole* system” – Deleuze and Guattari [1980] 1987,

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As the impact of big data on many different facets of human life has become more apparent, the volume of discussions surrounding these issues has grown quickly. Assessing the range of fields and variety of ways that big data will change the ways we think, learn, and play, one can see clearly the importance of understanding both the role that big data plays in these changes, and the laws, policies, and approaches that are developed for how we use and implement big data. At the most basic level, that of representation, big data offers the creation of an unprecedented historical record of human interaction and presence on the planet, along with an opportunity to probe that record for new insights about human nature itself (Aiden and Michel 2013). By almost every account, this shift is seen as one of both possibility and potential danger. As market after market shifts toward the digital, as seen most clearly in the music and publishing industries, there is a switch from models of scarcity to abundance, which is reflected not just by big data, but by the rise of the Internet itself and the increased volume and access to a wide variety of information (DuBravac 2015). This access

for individuals is almost always seen as harboring the most potential for good. However, this also leads to the potential danger that in the midst of too much information it is hard to make decisions, thus making it more likely to take intellectual shortcuts such as selectively choosing the information we like best and simply ignoring everything to the contrary (Pentland 2014; Silver 2012).

Perhaps the single most important driving force behind the explosion of the data that will fill these big databases is the increasing ubiquity of sensors. Because sensors are so cheap, they are being implemented widely from wearable devices leveraged by the Quantified Self (QS) movement to their inclusion in both small gadgets and large smart cities as part of the blossoming Internet of Things (IoT) (Duarte 2015; DuBravac 2015; Pentland 2014; Townsend 2013). DuBravac (2015) explains that the average smart phone in 2015 can, for an added manufacturing cost of only \$5.00, include all of the following sensors: proximity, ambient light, accelerometer, gyroscope, magnetometer, ambient sound, barometer, temperature/humidity, and M7 motion, which works to quickly combine information from several of the other sensors for an even greater level of information and detail. Each of these are leveraged to improve the normal functionality of cell phones, but app creators can also access their functionality and extend it in novel ways. One of the most widely used examples of this is exercise tracking apps that can tap into several of the sensors to develop a robust picture of the type of movement that a person is making, whether it's walking, jogging, running, or something else.

Exercise tracking apps are leveraged as part of the QS movement, encompassing 60% of U.S. adults who engage in “self-tracking of any kind of biological, physical, behavioral, or environmental information,” (Swan 2013). This type of tracking has fueled the rise of wearables such as the Fitbit, Pebble, and Apple watch. Although such tracking is linked to the individual, increasingly the data is being shared with corporations or open databases, which strive to analyze the data for greater insights. Swan points to projects such as Singly, Fluxstream, Bodytrack, Sympho.Me, Sen.se, Cosm, and Health Graph API which attempt to aggregate multiple sources of data from self-tracking projects. She explains that the hope of such organizations is that access to big data will lead to breakthroughs for extremely difficult health-related problems, such as preventively predicting heart attacks, in the same way that access to large enough sets of data have allowed for incredible progress in automated spelling correction, translation, and image recognition.

These individual sensors also naturally scale up to connect with sensors deployed at a wider level throughout homes and cities. The goal of ubiquitous computing, with sensors at the forefront, is to allow the technology to fade into the background as it acts automatically, by, for example, using QS trackers to sense body temperature, combine that information with an IoT connected thermostat that uses outside temperature sensors and current weather forecasts to automatically adjust the temperature in the specific room you currently occupy, using sensors to recognize both what room you happen to be in and the current temperature of that room in lieu of the rest of the building (DuBravac 2015; “Smart WiFi Thermostats by Ecobee”; Swan 2013; Townsend 2013). This is all possible now, but as DuBravac argues, it

will only become more automatic and seemingly invisible, as automatically opening doors at grocery stores are now. Although innovative progress on wearable devices has gotten mixed feedback, such as the widely-panned Google Glass, this trend in wearable and ubiquitous computing seems poised to mesh with augmented reality as well.

Of course, all this data is not valuable to anyone if it only sits in a database as it was collected; rather, it is primarily through the process of algorithmic analytics that new insights are developed. Even as we collectively look to the algorithmic discoveries made through access to big data, there are potential warnings to be heeded. On one hand, Lisa Gitelman (2013) reminds us that there really is no such thing as “raw” data that is used as input for these algorithms. She argues that instead of understanding data as a natural resource, we should instead parse it as a cultural resource that itself needs interpretation. Nate Silver (2012), who rose to prominence after predicting nearly all the state outcomes in the 2008 and 2012 presidential elections, argues that despite this growing trove of data, we are still not all that good at making predictions, because we often try to use data to tell a story about the way we *want* the world to be, rather than the way it *actually is*.

Despite such warnings, algorithms are increasingly being deployed to make predictions that drive corporate and political decision making processes. This includes relatively simple activities such as using search result interactions to test multiple versions of a title for a new book, all the way to more large scale corporate analyses such as Hewlett-Packard attempting to forecast and prevent employees from quitting, or a call center analyzing its callers on the fly and attempting to pair them with the customer service

representatives who are the best personality match, and thus the most likely to resolve the issue and do so in the shortest amount of time (Siegel 2016; Steiner 2012). Of course, in the push for greater profitability, this also drives customization in products and entertainment, because such customization leads to increased volume and variety of consumption (DuBravac 2015). This customization through big data has been seen prominently through Netflix's use of big data to help determine the topic, director, and lead actor of one of their early successful original series productions, *House of Cards* (Carr 2013). In 2016, the fourth season of the show even featured a big data story about the use of data from search engines to manipulate election results.

While big data is poised to increase consumption, one large question looms over how it will affect the availability of jobs. There remains an open question about whether sensors and big data will simply eliminate many jobs entirely or supplement them in ways that will require workers to learn new data-oriented skills in order to remain employed in their formerly data-free positions; yet seemingly no field is entirely free of this influence as data infiltrates law, retail, transportation, warehousing, leisure and hospitality, manufacturing, financial services, government, and education (DuBravac 2015). Taking just one example, if sensors and the use of data lead to the seemingly likely wide-spread deployment of self-driving 18-wheeler trucks, not only will millions of truck drivers lose their jobs, but this will impact the jobs of many in the service industry supporting truck drivers, such as those working at roadside diners across the United States, potentially creating abandoned ghost towns in the same way that the construction of the Interstate system caused towns along

highways to simply wither away (Santens 2015). If this happens across a myriad of industries, how will this reshape both the workforce and the economy? Will workers retrain with new skills for new jobs, similar to the model of the Industrial Revolution, or will this simply be a reduction in the quantity of jobs?

Academic work in the university is being reshaped by the influence of big data. Siegel (2016) argues that big data is driving the greatest scientific revolution of the past two decades, as it ushers in a shift of research emphasis away from the search for universals toward a deeper understanding of variability. Such a shift affects fields from astronomy to zoology, driving a resurgence in a model of empiricism that pushes us further away from a scientific method and toward a focus on data-driven scientific processes (Borgman 2015; Kitchin 2014). Social science has moved quickly in the direction of leveraging the larger data available through Internet surveys and social network analyses facilitated by social media (Borgman 2015). In the humanities, fields such as art and archaeology are leveraging data in new ways, while the growing field of digital humanities is able to increase the range and volume of sources that can be used for analysis through a wide variety of code and tools, such as Google's Ngram Viewer (Aiden and Michel 2013; Kitchin 2014).

At the political level, the sometimes-opposed concerns related to security and privacy have found themselves increasingly under scrutiny in the public sphere, especially since Edward Snowden, a former National Security Administration (NSA) employee, leaked documents that demonstrated the extent to which the United States government is collecting data on its own citizens through initiatives such as the PRISM program (Greenwald 2015).

Due at least in part to the press coverage generated by these leaks, President Barak Obama called for a ninety-day review on big data in January of 2014. The results of this review suggest that the public is “very much” concerned with the collection, storage, oversight, and transparency of usage related to big data (‘The Big Data and Privacy Review’ 2014).

Centering their findings on the ideology of preserving privacy values, the authors conclude their report to President Obama by suggesting six policy changes that would allegedly help ensure greater privacy protections (Podesta et al. 2014). These suggestions led to Obama’s 2015 call for a Privacy Bill of Rights. Despite this call, the United States has continued to struggle with issues of privacy, perhaps because of the desire to limit corporate exploitation of privacy on one hand, while simultaneously expanding government access to data.

At the corporate level, companies are seeking more and more ways to collect data that can be used to sell products and advertisements, as well as to sell data in various forms to other companies. Social networking sites very clearly see users as products rather than customers, and such sites are considered under U.S. law to be public spaces with no reasonable expectation of privacy (Goodman 2016). Over 80% of apps on the Android platform track online activities and location information, while Google uses over 57 different information sources to personalize its search results (Gitelman 2013; Goodman 2016). The Whole Foods grocery store chain has installed digital signs that are actually face trackers, while physical stores, malls, and even billboards are using cell phone signals to track and analyze customers’ movement through stores and cities; additionally, car dealers can monitor cell phone signals to get reports about what an approaching customer has searched online

(Angwin 2015; DuBravac 2015). Despite rhetoric from government officials, very little has been done to curb such corporate data usage.

At the same time, the U.S. government is working to expand its own ability to capture and utilize data at almost every level, beginning with the election process itself. In the 2016 U.S. presidential election, many of these issues related to data usage and privacy rose to the forefront of the discussion. Presidential candidate and Texas Senator Ted Cruz developed over 4,000 data points on every voter in order to create a custom personality profile with strategically developed persuasive talking points to be leveraged in one-on-one conversations, while search engines and social networking sites have demonstrated potential to use algorithms to alter election outcomes (Aiden and Michel 2013; Detrow 2016, Epstein 2016). Outside of the election process, the Apple corporation actively resisted the U.S. federal government's requests that it create software to unlock the phone of a terrorist implicated in the 2015 San Bernardino attacks, citing privacy and cyber-security concerns (Cook 2016). President Obama also expanded the ability of the NSA to share its bulk data collection with other intelligence agencies (Savage 2016). The tension between security and privacy, however, was easily dismissed by John Yoo, then a lawyer in the Justice Department's Office of Legal Counsel, in a 2001 letter to President Bush regarding the creation of the Stellarwind bulk data collection program: "We face a situation here where the government's interest on one side — that of protecting the Nation from direct attack — is the highest known to the Constitution. On the other side of the scale, the intrusion into individual

privacy interests is greatly reduced due to the international nature of the communications,” (quoted in Savage and Lichtblau 2016).

However, some argue that this tension only exists in the first place because of the prominent role of fear in light of terrorist activities around the globe, despite the fact that surveillance activities have never been demonstrably effective at preventing such attacks (Andrejevic and Gates 2014; Schneier 2015). Further, the effects of surveillance appear to be detrimental at nearly every level. For example, children who were aware that their otherwise enjoyable playtime activity of completing puzzles was monitored by a camera showed a decreased interest in their play, which decreased even more when they were given rewards for completing the puzzles (Angwin 2014). This link seems to be mirrored in studies about self-tracking, demonstrating that while such tracking can boost productivity, it ultimately decreases satisfaction in a wide variety of studied activities ranging from exercise to reading (Etkin 2016). Despite some media and corporate pushback on increased government surveillance, especially in light of its ineffectiveness and ability to decrease enjoyment, there has been almost no movement within government to limit this surveillance or update outdated pre-Internet privacy laws, perhaps because the black box nature of the way that big data functions prevents most citizens from fully understanding the implications of this new big form of data surveillance (Pasquale 2015).

In many ways, this emphasis on privacy aligns with academic attempts to understand the challenges associated with big data. For example, the 2012 Microsoft Global Privacy Summit attempted to generate updates to the rules related to notice and consent that are

largely based off resolutions created in 1980 by the Organisation for Economic Co-operation and Development (OECD) Privacy Guidelines (Cate and Mayer-Schönberger 2013). These rules require companies and organizations to disclose what data they are collecting and how it will be used, and to give the user the opportunity to opt out of use of the product or service if he or she does not agree to such practices. However, the practice of notice and consent does not allow for the potentially valuable secondary uses of big data, which have included real-world examples such as Google's prediction of flu outbreaks, fraud prevention, and medical research (Mayer-Schönberger and Cukier 2013; Cate and Mayer-Schönberger 2013). These secondary uses of data occur when data is analyzed in ways it was not originally intended, which means it would not have been possible for a company to provide notice to its users about this use at the time of collection. Further, the complexity of the collection process itself makes it difficult for most organizations to accurately report the ways data is being collected and used. These issues present difficult challenges to the attempts at protecting user privacy in the era of big data and create a structural incentive for organizations such as the CIA to collect and store everything forever (Andrejevic and Gates 2014).

Considering these difficulties, some academic discussion of big data has, in contrast, focused on the waning effectiveness of any form of privacy protection in light of the expansive use of big data, even suggesting that the very concept of privacy no longer makes sense in discussions of big data, at least in part because such large quantities of data easily enable de-anonymization (Mayer-Schönberger and Cukier 2013). In an attempt to move past notions of privacy, some scholars are attempting to think about big data using

alternative frameworks that move beyond these more traditional concerns. Mayer-Schönberger (2009) has suggested the implementation of a policy that allows for a built-in automatic deletion of data after a pre-determined period. Mark Andrejevic (2013) argues that rather than focusing on privacy, a much more useful framework for analysis would be power and the imbalance created by the big data gap between those with access to big data infrastructure and those without. These challenges and perspectives will be analyzed more closely in Chapter 3.

Clearly, big data is positioned to affect the lives of almost everyone in a variety of ways, even if those effects are secondary effects such as the loss of service jobs due to automation in the trucking industry. Seen in this light, the way we think about, understand, and discuss big data and information is of vital importance in shaping the future of both our lives and the planet. One problem that has made the issues surrounding big data seem so difficult and intractable is that these discussions ultimately rest on one quite limited understanding of the nature of information and big data.

The Common Thread: The Problem-Space of Information

Despite the seeming variety of approaches to big data, all of these discussions still prioritize an understanding of information (and data) as a resource. Balnaves and Wilson (2011) argue that this is the predominant framework through which information is thought. Behrenshausen (2016) extends this analysis by emphasizing the ways in which a “resource doctrine of information” authorizes a very specific kind of subject that aligns closely with the

Enlightenment-era perspectives on the individual centered on reason, consciousness, and rights. Drawing on Lawrence Grossberg's notion of the *problem-space* as a set of tensions related to a particular issue, Behrenshausen argues that the *problem-space* of information also makes apparent the problematic notion of agency, because the Enlightenment-era subject bound by a resource doctrine of information is limited to particular ways of acting as an agent. Big data, frequently understood as a large collection of information, is similarly understood from within a resource doctrine. This model of information as a resource can be seen clearly through the metaphors that are applied to discussions of big data, referring to it as, among other things, the new oil (Hwang and Levy 2015). In this section, I discuss the results of a quantitative analysis I performed on the way the term "big data" is visualized as a metaphor on the web.

Here I would like to briefly note that the framework of metaphors will not align well with the material, embodied information and mixed semiotics approaches that I draw upon and develop in later chapters. Metaphors rely on a transcendent identity, while my approach is immanent. However, within the current *problem-space* of information, big data is theorized often drawing on the concept of metaphors. Therefore, I begin my work firmly within the current *problem-space*, accepting somewhat uncritically the metaphor paradigm to better understand current approaches. I argue that doing so makes it even clearer why a new *problem-space* needs to be created – a process that I will undertake in subsequent chapters.

Although current research describes the written metaphors that have been used for big data, there is no quantitative analysis that demonstrates how frequently each metaphor has

been applied (Puschmann and Burgess 2014; Watson n.d.; Hwang and Levy 2015).

Developing some understanding of the frequency with which visual metaphors are applied is important for better understanding the current trend in interpreting and understanding the concept of big data. This could be helpful, for instance, in attempting to shape public opinion regarding new laws about big data and privacy. For example, Hwang and Levy argue that if data is primarily conceptualized as a natural resource, policy decisions might reflect past trends that have allowed resources to be exploited for both economic growth and private gain. Alternatively, if one believes that our policy decisions should reflect greater emphasis on privacy protections, then it would be important to emphasize a different dominant metaphor for data such as one that is material and embodied. Further, the dominant metaphors used for big data also impact our understanding of the subject and agency, as Behrenshausen (2016) has argued.

The question of the impact of both metaphors and visuals on the way one thinks about and interacts with the world around him or her has been widely discussed (Lakoff and Johnson [1980] 2003; Rodriguez and Asoro 2012). However, these arguments address the impact of visuals and metaphors separately, rather than assessing the combined impact visualized metaphors. In the following section of this chapter, I consider the way that metaphors have been depicted visually with special attention to the concept of big data through a quantitative analysis of image search results related to the phrase “big data.” The objective is to provide a first step in understanding how these visual metaphors impact one’s

understanding of big data by first identifying the frequency with which big data is represented as each metaphor.

Big data is an abstract term that has been difficult to define, particularly because it has been leveraged in different ways in various fields. Interdisciplinary definitions have attempted to account for all of these uses. Jules Berman (2013) offers the following definition:

1. Volume – large amounts of data
2. Variety – the data come in different forms, including traditional databases, images, documents, and complex records
3. Velocity – the content of the data is constantly changing, through the absorption of complementary data collections, through the introduction of previously archived data or legacy collections, and from streamed data arriving from multiple sources. (xx)

Yet, even this definition relies on the vague use of “large” amounts of data. Elsewhere we see a more colloquial attempt at a definition: “‘Big Data’ is a term that describes the accumulation and analysis of information. Lots of information. Oceans of information.” (Gardner in Smolan and Erwitte 2012, 14). This lack of a concrete definition makes understanding such a new concept through metaphors particularly important: “This is the primary purpose of metaphor: to carry over existing names or descriptions to things that are either so new that they haven’t been named or so abstract that they cannot be otherwise explained.” (Geary 2012, 20). Metaphors can help us understand the concept of big data better than a definition alone. Lakoff and Johnson ([1980] 2003) demonstrated the way that metaphors for the similarly abstract concept of inflation helped to set goals and motivate

actions. Recent research on big data suggests that its effect on privacy necessitates potentially large changes in policies related to data, particularly with regulations such as notice and consent (Cate and Mayer-Schonberger 2013; Barocas and Nissenbaum 2009). Hwang and Levy (2015) argue that the metaphors society uses for data can have a direct influence on not only the ways that individuals think about them, but also the policies that they create. In that way, the metaphors one chooses to use can help him or her actually shape the future and impact the way we conceive of agency (Wyatt 2004). An important aspect of changing these metaphors also consists of reading them as tropes of collective discourse that are expressive of broader historical statements of power relations and polysemiotic regimes.

Communication studies has long understood visuals as capable of both capturing metaphors used for concepts and making them easier to understand and remember (Entman 1991). Not only do readers tend to notice visuals first, but because they carry a lighter cognitive load, readers are more likely to remember and accept the latent arguments of images over that of text (Rodriguez and Asoro 2012). From a more posthuman perspective, one can interpret the relevance of these images through a non-discursive, ambient, or affective approach to rhetoric that emphasizes the material grounds of rhetoric broadly and the images specifically (Brunner and DeLuca 2016; Murray 2009; Rickert 2013). “Today’s scene is predominantly visual and panmediated. Indeed, words are still an important component of argumentation, but the proliferation of images demands that scholars concern themselves with the persuasive use of images as they travel among new media users,” (Brunner and DeLuca 2016, 286). Because of the persuasive importance of visuals in shaping

the way one understands concepts, determining how frequently big data is visualized as a particular metaphor can be an important first step in developing an understanding of how big data is most widely conceptualized. The term metaphor perhaps still clings too closely to a discursive framework, but by studying “visual metaphors” I aim to align such research more closely with posthuman affective rhetoric.

To understand the way that the metaphors of big data are communicated visually, this study analyzes the content of images associated with the phrase “big data”. The sampling method was adapted from Rodriguez and Asoro (2012). The sample images were collected using a Bing Image search on February 18th, 2015, and saved to a local hard drive. Bing was selected because it offered a larger number of results than Google. Additionally, Bing’s image search algorithm offers several advantages that provide higher quality image results than Google’s image results. These improvements include accounting for entity understanding, customer feedback, computer vision technologies, thematic intent focus, elimination of exact and near duplicate results, and quality of the image (Merchant 2013). Practically, this search resulted in a larger number and variety of high quality images for the search phrase “big data” and for this reason synonyms were not included.

The search was completed using an incognito browsing tab with no accounts logged in, to minimize the influence of personalized results. However, some personalization may have still occurred due to location detection by the search engine. This search was performed in the Southeast United States. The first 500 images in the search results were selected to form the sample and duplicates were discarded, along with images that were clearly not

related to big data. After discarding images, the sample was 492 images. This method represents a purposive sampling process to capture a wide but manageable range of the images available via the Internet. Because this is exploratory research, it does not seek to generalize the results.

Measures were generated by consulting literature regarding the predominant metaphors used for big data (Puschmann and Burgess 2014; Watson, n.d.; Hwang and Levy 2015). Two variables were coded for each image. The first variable represented the visual metaphors manifestly present in each image. Multiple concepts could be tallied for each image. These concepts included (1) nature (2) industrial (3) human (4) code (5) networks (6) literal (7) write-in. Nature was defined as depicting something that occurs naturally, such as water, clouds, or a natural resource. Industrial was defined as something that has been created or crafted by humans, including the process of mining and physical servers. Human was defined as a representation of a person in whole or in part. For example, a picture containing only eyes would be coded as human. Networks were defined as visual depictions of network, including nodes and edges. Code was defined as a primarily alpha-numeric depiction, including images such as math symbols, formulae, 1s and 0s, and graphs. Finally, the literal category was meant to capture all the images that did not portray a metaphor, such as word clouds, signs, and cartoons that used the actual phrase “big data” as part of the image. In addition, a write-in category was included to allow the coder to include any metaphors that were not identified in the initial literature search. This variable used a nominal measure, but

was only coded for presence or non-presence as a way of determining how many times each appeared in the sample images. Presence was coded as a 1 and non-presence as a 0.

Three peers separately reviewed the measures to provide feedback, thus enhancing face validity. Further, these measures were pretested on 50 images not included as part of the sample. The author was the primary coder and a second coder performed an intercoder reliability analysis on the additional images. Reliability was calculated using Krippendorff's alpha (α). Intercoder reliability results were as follows: 0.61 for nature, 0.65 for industrial, 0.85 for human, 0.82 for code, 0.70 for networks, and 0.67 for literal. The primary difficulty with coding relates to the fact that each image could be coded for multiple metaphors, and some images left much room for subjective interpretation of exactly how many of the metaphors were represented. For example, an image of a hand holding a cloud seems to be predominantly a nature metaphor, but might also be coded for the human metaphor. Further, some of the more abstract images make it hard to determine exactly what is being depicted. The write-in option in the coding for metaphors increased the validity of the results by leaving open the possibility for inclusion of metaphors that were not identified by the initial literature review.



Figure 1: Example of image with a “code” metaphor. DARPA 2013.

Of the 492 images, the most frequently occurring representation of big data was a literal interpretation. This literal presentation of the words “big data” was found in 75.8% of the images in the sample. The next largest representation was the industrial metaphor with 27.6% of the images using some type of visual depiction of big data as industrial. The nature metaphor occurred 23.6% of the time, followed by code with 19.7%, networks with 17.3%, and human with 11.8%. There were no write-ins for the analysis because the coders could place each image in a pre-determined category.

Table 1. Frequency of big data metaphors in web images

<u>Variable</u>	<u>Frequency % (N=492)</u>	<u>Count</u>
Nature	23.6%	116
Industrial	27.6%	136
Human	11.8%	58
Code	19.7%	97
Networks	17.3%	85
Literal	75.8%	373
Write-In	0.0%	0

The literal use of the phrase “big data” was by far the most common way to represent big data on the web, appearing in just over 75% of the sampled images. This result is understandable for a couple of reasons. First, the literal representation can easily be added on top of any metaphorical representation that is present without altering the context of the image in any way. Second, it also speaks to the difficulty of visually depicting the concept of big data, which can be problematic to define even textually. Therefore, by far the easiest way to visually depict big data is literally. Additionally, it may also relate to how images are coded by search algorithms, since I used the phrase “big data.”

reflected in images such as an oil rig that depicts data as code erupting from out of the ground through an industrial oil rig. Another common natural metaphor is that of the cloud, which indicates the place where our data is stored—the omnipresence of big data as existing all around us and as ephemeral. This metaphor serves to cover up the actual industrial resources such as servers and transatlantic cables that are required to keep data flowing.

The human metaphor was the least depicted of all the metaphors. This lack of human presence in our metaphors for data is particularly worrisome from a traditional ethical perspective:

Our current data metaphors do us a disservice by masking the human behaviors, relationships, and communications that make up all that data we're streaming and mining. They make it easy to get lost in the quantity of the data without remembering how personal so much of it is. And if people forget that, it's easy to understand how large-scale ethical breaches happen; the metaphors help us to lose track of what we're really talking about. (Hwang and Levy 2015, para 13)

This emphasis is striking because of its potential impact on discussions related to policies and regulations surrounding big data, as it will tend to favor policies that allow corporations to exploit big data for additional profits. Yet, the majority of these data are personal data either about people or the products and places that people interact:

And just as the history of resource exploitation in America—from westward expansion through the Gold Rush, and beyond into modern-day debates about water

and air rights—involves the appropriation of resources that belonged to someone else, online data collection policy treats personal information as a natural, inexhaustible good—ripe for exploitation in the name of economic growth and private gain.

(Hwang & Levy 2015, para. 12)

My quantitative results clearly show that big data is entrenched within a capitalist resource-oriented problem space, which is likely to drive ethical and political decision making processes related to big data.

There are several directions for future research that could help to both clarify and expand the results of this project. Most pressing, research into the individuals and/or companies that are responsible for the creation of these images would place the images in context much more clearly. For example, it will be important to understand if the businesses themselves are creating these images that support pro-big business reasoning regarding big data. If this study were to be conducted again in the future, it would be helpful to also collect information about the site that hosted each of the images in the sample, including the URL and the type of site, *i.e.*, corporate business, nonprofit, education, and possibly conduct audience research on how people actually respond, affectively and cognitively, to such images.

Additionally, a further breakdown of each category of metaphor may prove useful in expanding the understanding of how these metaphors function. The current study was intended as a broad overview, and for that reason purposely included several different metaphors within each category. For example, within the nature category, metaphors of both

clouds and water were included. Although these certainly fit the general theme of nature, it may prove fruitful to think about the differences between these metaphors at a deeper level of analysis. Data as a liquid (water) may promote very different understandings than those of data as a gas (clouds).

Finally, future research may work toward developing metaphors for alternative approaches to data and how these can be depicted visually. This would be an important step in countering the currently dominant industrial narrative that exists rhetorically within both the textual and visual frames:

We need a new framing of a personal, embodied relationship to data. Embodied metaphors have the potential to bring big data back down to a human scale and ground data in lived experience, which in turn, will help to advance the public's investment, interpretation, and understanding of our relationship to our data. (Watson, n.d., para. 5).

Watson suggests some possibilities for framing this metaphor of embodiment, such as fingerprint, footprint, blood, DNA, and more. A qualitative study that considered the ways these metaphors impacted one's understanding of big data would be an important research step to undertake before advocating for a new framing of big data. However, I argue that rather than developing an embodied *metaphor* for big data, it is more important to develop a material and embodied philosophic concept of information and big data. This is the larger goal of my work.

The quantitative results explored above confirm that the resource doctrine dominates the current problem-space of information and big data, which in turn emphasizes and shapes both the policies that are created about big data and the ways that we understand our own agency and notions of self. Behrenshausen (2016) argues that the way we answer challenges to the problems related to information is constrained by the dominance of this resource doctrine of information. This dissertation intervenes in the current problem-space by offering an alternative doctrine of information and big data that opens up a new method for experimental approaches to subjectivation as alternatives to the Enlightenment-era subject and its related notions of agency. However, understanding the way that big data can offer new approaches to subjectivation requires first accounting for the historical genealogy of the current problem-space of information, as well as a closer look at the way that critical theory has failed to offer productive input into the problems associated with big data. These topics will be the focus of the following two chapters. In the next section, I give a brief overview of how the work of Gilles Deleuze and Félix Guattari will be leveraged in way that can destroy this predominantly human approach of the resource doctrine of information and big data.

Destroying the “Human” Face of Big Data

Although the phrase “big data” is used with increasing frequency, many people have only a vague understanding of big data and how it is being used. One of the works that has attempted to make the impacts of big data most accessible to a general audience is *The Human Face of Big Data* (2012), a project that has included a large format book with slick

photography and design, lesson plans for teachers to use in the classroom, a companion app for mobile phones, and a 2016 Public Broadcasting Service documentary featuring state of the art visualizations. The book's author foregrounds the human connection in his introduction: "...one unifying message is clear: the real-time visualization of data streaming in from satellites, and from billions of sensors, RFID tags, and GPS-enabled cameras and smartphones, is enabling humanity to sense, measure, understand, and affect aspects of our existence in ways our ancestors could never have imagined in their wildest dreams," (Smolan in Smolan and Erwitte 2012, 3). At the core of all of this big data sits the human, who senses, measures, understands, and ultimately controls and directs the flows of information as their "face."

For Deleuze and Guattari ([1980] 1987), though, the face is a white wall/black hole system that exists at the intersection of the semiotic systems of signification and subjectivation, defining a zone of probability which serves a normalizing role. Signification is a white wall, they claim, that inscribes signs and redundancies, while subjectivation is a black hole in which consciousness, passion, and redundancies are lodged. Although the face is produced in humanity, it contains something inhuman within it. This concept of the face, produced by the abstract machine of faciality, generates an alternate reading of the human "face" of big data. Might we understand big data and the algorithms that process it as existing at the intersection of signification and subjectivation (via capture of desire and articulation to diagrams/axiomatics of capitalism), produced in humanity but ultimately inhuman, defining norms through zones of probability? Deleuze and Guattari describe the

black hole as a central computer that makes distinctions: man or woman, rich or poor. Then the abstract machine of faciality responds, allowing or disallowing passage based on the facial units it receives. The concept of the face in many ways serves to preview Deleuze's ([1990] 1995) essay, *Postscript on Control Societies*, which deals with the concept of the digital more directly than any of his other work. In the control society, the key concept is codes or passwords that decide who should be allowed or denied access to information.

Big data increasingly plays this role. Patricia MacCormick (2004) explains that, "when we are facialised, we are made visible only within one dominant system and in the only manner that the dominant system understands," (136). For Deleuze ([1990] 1995), in the control society, "individuals become '*dividuals*,' and masses become samples, data, markets, or '*banks*,' (180). In this sense, the big data created by apparatuses of surveillance and data capture facialize the human into the control society network where decisions about access are made constantly. What product recommendations will you receive on Amazon? Do you have access to that particular LinkedIn profile? Do your Facebook friends have good enough credit scores that your loan application will be accepted (Bhattacharya 2015)? If we accept that this abstract machine of faciality can be understood as the human "face" of big data, then the further question is how we might take seriously Deleuze and Guattari's ([1980] 1987) claim that, "the face has a great future, but only if it is destroyed, dismantled. On the road to the asignifying and asubjective," (171)? How do we destroy the human face of big data? This is the driving question of my dissertation project, but to give a proper answer we must

understand current approaches to big data and how those approaches have been historically constructed.

CHAPTER 3: Critical Theory and the Need for the Affirmative Turn¹

“We cannot anticipate the type of patterns that will emerge until we run the algorithms: in this regard, we are at the mercy of our databases.” – Mark Andrejevic 2013, 18

Many of the challenges associated with the rise of big data have been addressed by scholars working within the critical theory tradition. Despite much of the excellent work being done in this area, such an approach can never be enough because it still falls back on the conceptual framework of the neoliberal individual subject. In addition to this critical approach toward big data, an affirmative turn is needed to generate new concepts and new lines of flight to experiment with new processes of subjectivation that become possible through big data. This chapter explores several current critical theory approaches before making clear the need for an affirmative turn. From the perspective of critical theory, privacy and commodification stand out as important conceptual lenses for understanding and critiquing the uses of big data.

Exploring big data from the frameworks of privacy and commodification, one must begin by noting that as our world increasingly becomes further datafied, we must understand how data is collected, who owns this data, how people make money from this data, and how all these changes affect our traditional understanding of privacy. Much of the data now being generated is understood from within critical theory as related to individuals on a personal

¹ An earlier draft of this chapter was published as “Little Brother: How Big Data Necessitates an Ethical Shift from Privacy to Power,” in the edited collection *Controversies in Digital Ethics*. That material has been adapted and used here by permission of Bloomsbury.

level. It can range from something basic, like what books he or she buys online and which websites he or she has visited, to the more advanced biometric data of the kind collected by those involved with self-tracking movements, such as the quantified self, which is often collected using proprietary hardware and software that stores data on the cloud, thus clearly putting it in the hands of businesses and their big databases. Traditionally these issues have been understood through ethical frameworks associated with notions of commodification and privacy. For example, one might hold a particular individual ethically responsible for willingly trading his or her data for access to websites. Alternatively, laws could be passed that allowed companies to only collect and/or use customer-generated data in very specific ways.

The ability of both people and organizations to leverage big data in new ways has rendered the traditional frameworks for dealing with these issues ineffective and archaic. The leveraging of such data raises concerns for contemporary critical theorists beyond the questions of commodification and privacy to questions of power generated for businesses through the big data divide—the gap separating those who have access to big data and those who do not (Andrejevic 2013). Using big data undoubtedly does encroach on the privacy of consumers. However, because big data also offers so many benefits, it is difficult to craft any regulation that can uphold both consumer privacy and the beneficial outcomes of big data such as medical breakthroughs, fraud prevention, and reducing energy costs. Traditional legal protections such as anonymization and notice and consent are rendered ineffective by big data. It also becomes difficult to hold an individual ethically responsible for trading his or her

data for access, as this trade is necessary if one is going to participate in the contemporary technologically driven world. Although these issues are historically connected to commodification, a new framework is needed for the age of big data. Although analyzing big data through the framework of power is quite useful in its ability to highlight power discrepancies, this approach offers few alternative uses of big data or ways to overcome the big data divide. Instead, approaching big data affirmatively through the framework of subjectivation offers the greatest range of possibilities for new ways to use and understand big data.

Historical Roots of the Commodification of Data

The development of the commodification of big data can be traced to the emergence of the media audience as a product. Dallas W. Smythe ([1981] 2012) helped usher in a view of the audience as a commodity that does labor, departing from traditional Marxist analyses that lump all press and their advertisements together with other superstructure organizations such as education. Advertisers are buying “the services of audiences with predictable specifications which will pay attention in predictable numbers and at particular times to particular means of communication (television, radio, newspapers, magazines, billboards, and third-class mail) in particular market areas” (188). Although not every audience member will be paying attention to every advertisement, the sheer volume of advertisements assures that, probabilistically, many viewers will see each one. While on the surface it seems like audiences are simply trading their unpaid work time for program material and

advertisements, the audience members are also paying for the ability to play these programs and advertisements through purchasing the viewing equipment, such as a television, in addition to a monthly cable fee. Smythe ([1981] 2012) estimates that audience members in the United States paid three times more to watch programs and advertisements than the advertisers paid to place the ads (191–92).

What work is it that the audience is doing while watching advertisements? They are learning to buy goods. The audience, then, ends up paying for the privilege of doing work rather than being themselves remunerated. Smythe ([1981] 2012) argues that through this understanding, every minute of one's life is commodified and used for work, be it in the traditional sense, or through restorative work, such as eating and sleeping, which prepares one for work the next day, or through one's labor time being sold as an audience commodity (197–200). Yet, this work being done as an audience does in some ways overlap with the needs that arise in one's life. We all need to buy some type of soap to keep us clean, for instance. But what kind of soap should we buy? What scent? What brand? Multiply these questions by the hundreds of products a typical household will purchase in a month and it quickly becomes impossible to rationally research which decisions are best in all cases. Ultimately, this understanding of the audience doing work eliminates the clear distinction between Marxist understandings of base and superstructure. Media scholars (Andrejevic 2006; Andrejevic 2009; Cohen 2008; Terranova 2000; van Dijck 2009) have extended this notion of commodification to popular social media websites, going so far as to show how Google's targeted advertising system is able to commodify users at an individual, rather than

an aggregate level. I will analyze how websites such as these utilize big data in this process of commodification, as well as its implications and challenges for traditional ethical frameworks.

Becoming Big Data

Smythe's ([1981] 2012) understanding of the audience as a commodity can be extended to the modern use of big data in two distinct ways: first, through a richer commodification of data generated during "free" time; second, to further extend audience segmentation in the service of driving impulse purchasing. Though Smythe is correct in pointing to the ways that all leisure time was commodified through the creation of audience and preparation for future work, the link was in many ways still relatively small in that all leisure time was categorized as simply as preparation for further work. Through commodification of data related to daily experience, it is now possible to trace a direct link. To fully appreciate the power of big data and the extent to which it has been commodified, I will consider some concrete examples: 1) the way that Facebook has leveraged demographic, web browsing, and screen movement data for its advertising platform, 2) Verizon Wireless' usage of multi device browsing and cell phone location data aggregation, and 3) BlueKai's use and aggregation of multiple big data sources for micro-targeted advertisements. These three cases will highlight the way that power discrepancies arise through these organizations' ability to collect and use large amounts of data that generates insight about how to induce

action of viewers. Individuals typically do not have access to this data, and, further, do not know in exactly what ways such data is being used to manipulate action.

To start, there are many similarities between Smythe's ([1981] 2012) analysis of the cost of advertising compared to the cost to consumers to maintain the devices on which the advertising is done. Users access Facebook through computers using traditional Internet connections or via mobile smart phones or tablets. In many cases, the Facebook audience seamlessly switches the mode of access between these devices depending on their location. In such a case, they pay for computer and cell phone devices, as well as Internet connections and mobile data plans. Although the service of Facebook itself is free, there are typically substantial costs incurred in the process of accessing the platform. Once able to access the platform, users still do the work of reading ads in Facebook. Further, the distinction between personal status updates and sponsored posts is subtle. With traditional mass media, one might trade the viewing of advertisements for the entertainment of the content. With a site such as Facebook, the users are actually laboring further to create that entertaining content themselves.

Once a user creates a Facebook account, the system automatically begins to collect and commodify a large amount of data. The latest financial filings show that the average revenue per user in the US and Canada is \$5.85 (Petronzio 2014). Facebook generates this revenue by selling information to advertisers. First, there is the information that users willingly and knowingly input into their accounts: age, gender, hometown, etc. Additionally, by connecting with other people, one tells Facebook with whom they are friends. Each status

update provides insight into his or her interests and behaviors. However, this information is only the beginning. Facebook offers its login system for use to other websites and applications via a standard software development kit (SDK). This allows Facebook users to easily log in, interact with, and comment on a wide variety of sites and applications without creating separate login credentials for each of them. This added benefit to the user comes at the cost of allowing Facebook knowledge of one's visits to each of these sites, effectively giving Facebook the ability to understand one's internet browsing habits over a wide variety of websites. Even if a user is not currently logged in to Facebook, or does not use the Facebook log in function on other websites, Facebook, like most major sites, places tracking software in the form of cookies on users' computers to collect data. Even a user who does not have a Facebook account, but visits a partner site associated with Facebook, will generate a cookie to collect anonymous aggregated data ("Cookies, Pixels & Similar Technologies" 2014).

Facebook uses this type of personal information to help sell advertisements by segmenting audiences, often through connecting with other large datasets. A few examples given on the Facebook advertising page help explain how this process works. First, and most obviously, advertisers could use information you have already provided them to market to you, for example, a store might show ads to users who are already subscribed to their newsletter ("About Advertising on Facebook" 2014). Additionally, Facebook allows marketers to use other information they have on consumers to direct advertisements at them. Two examples highlight just how complex this process can be. First, it might allow

companies to display ads to users who have previously visited their websites. Additionally, the advertisements may also be based on real-world shopping habits as well, as in a grocery store using rewards card information to promote a sale to all of its customers on Facebook who regularly purchase orange juice (“About Advertising on Facebook” 2014). In these ways, Facebook makes it quick and easy to sell advertisements to very specific audiences, based not just on information one has intentionally entered into the site, but based on other activities such as websites that have been visited and purchases that have been made at stores. Importantly, these data have more to do with behaviors than with elements of demographics or “identity.” In other words, this model of advertising moves beyond traditional demographic based models that rely on identity by making assumptions about the needs of persons of a particular age, marital status, and/or income level.

On top of this, Facebook takes advantage of big data to extend its mastery of impulse buying or—perhaps more accurately in this case—impulse clicking. The social networking site can track and record all of the actions users take on its website, including things as detailed as how long the mouse hovers in a certain position and which part of a website is visible on the screen. This information can be used for a wide range of purposes, but has been specifically leveraged to develop targeted advertising (Rosenbush 2014).

This type of tracking extends traditional A/B and multivariate testing of websites to much greater on-page analytic capabilities. A/B and multivariate testing makes it possible for a website to create two or more versions (A and B, etc.) of a particular web page and test the effect of the differences between them on a desired outcome (Sylvia IV 2010). For example,

a store might test which version of a web page leads to more completed sales or a greater number of newsletter subscriptions. Generally, only one element of each page is changed in A/B testing, e.g., the color of a link, while multiple components are changed in a multivariate test. Each of these little bits of data adds up to a bigger picture of user behavior. Leveraging big data analytics to understand this behavior and its correlation to desirable behaviors such as ad clicking allows for Facebook to fine-tune the way its pages are displayed, certainly overall but even on a user-by-user basis. Not only is the consumer directly generating all the content that draws other users to Facebook, but their movements on the site are being datafied and sold to advertisers. Consumer labor is more robustly than ever a source of profit (Andrejevic 2002). Facebook uses this data collection and tracking primarily so that it can sell advertising that is used to manipulate consumers into taking some action ranging from following another Facebook page to purchasing items on a 3rd party site. Although such analysis cannot go so far as to prove causation, it does demonstrate a correlation between these changes and more users taking a desired action. This correlation is enough to convince companies to alter their websites based on such changes.

Verizon wireless creates an interesting question of privacy, as it extends the issue across multiple devices. If Verizon Wireless customers use a computer to access their Verizon account, the website automatically, and without consent or notice, installs a tracking cookie that tracks all the user's web browsing—web browsing done on devices that do not even use Verizon's service (Lazarus 2014). This data can then be sold to marketers and used across platforms and devices: "So, by way of example, let's say you enjoy watching videos

on the Victoria's Secret website on your personal computer in the privacy of your home. You shouldn't be surprised if ads for women's undergarments start appearing on your Verizon Wireless mobile device” (Lazarus).

Though this type of data collection for commodification is similar to that of Facebook, Verizon is able to add an additional level of information that includes a consumer's location. Verizon's Precision Marketing Insights division has successfully partnered with the National Basketball Association team the Phoenix Suns to use location data for marketing:

Verizon uses that granular location data to keep track of which Verizon Wireless-enabled devices were in a sports arena, or near it, or at a particular fast food restaurant or car dealership. Though Verizon holds on to that device-identifiable data, it provides a more general view to its clients after “hashing“ or anonymizing the data. Clients like the Suns end up with aggregated data on the types of people who visited a venue and later visited a sponsor's place of business. Verizon layers on Experian profile data to segment consumers demographically. For example, it can report which percentage of an audience segment who attended a game then visited a sponsor's burger joint at a particular time on a given day afterwards. (Kaye 2013)

In this example, Verizon is able to determine how many people were exposed to an advertisement in one location, and then physically visited a location related to the advertising. The physical movement associated with the leisure activities of watching a basketball game and having dinner are now directly commodified. Facebook is currently in

the process of rolling out its own platform to allow for location-based advertising (Constine 2014). These location-based tracking systems extend the range of activities that companies can commodify, moving past indirectly commodifying leisure activities as preparation for work to the direct commodification of one's physical location in space, blending the personalization of online and physical locations in ways that echo the often referenced ads in Steven Spielberg's film *Minority Report* (2002). Yet, the true potential of big data is only realized when multiple datasets are combined: "Corporations can exploit information precisely because they can aggregate it—because the information gains in value when it is placed within a larger information environment that individuals cannot access" (Andrejevic 2002, 258). It is no longer difficult to imagine the Phoenix Suns determining which advertisements to display at each night's game based on an aggregated browsing history of the fans in the stands on that particular night.

Big data management organizations such as BlueKai and Exelate, as well, work to aggregate and sell this data as part of marketing strategies. On its website, BlueKai explains its partnership with 30 sources of big data and how each dataset can help customize microtargeted advertising (BlueKai 2014b). One of its partners, MasterCard Advisors, "analyzes the spending patterns across billions of anonymous transactions to segment like-spending patterns into anonymous groups called micro-segments" (61). Experian Marketing Services' "TrueTouch segmentation system offers 11 Touch-points to define the motivational messages that appeal to various audiences. Understanding Touch-points makes it possible for advertisers to align offers with the values and attitudes of the consumers they wish to reach,

using language proven to resonate” (41). Touch-points are points of contact between companies and their customers. Acxiom offers demographic information (occupation, gender, education), real property data (home type, home value, length of residence), age, date of birth, income, net worth, and buying activity categorized by type based on purchase history information (7). Combining just these three datasets with information from Facebook would allow one to create a highly micro-targeted ad to someone who is known to buy a particular type of product, and provide the advertiser with language to which the consumer is particularly drawn.

What about combining the data of Facebook, Verizon, and BlueKai? BlueKai offers just such an example with their white-paper, “A Top Wireless Telco Creates 6x Lift in Facebook Ad Performance & Reduces 3rd Party Data Costs 50%” (BlueKai 2014a). The ability to leverage such vast amounts of information fundamentally alters the way we need to think about privacy and power. It represents what Andrejevic (2013) describes as an undemocratic shift in knowledge practices that creates a big data divide. Large national and transnational corporations are able to collect and/or purchase information that allows them to derive insights about the way individuals act and make decisions, which ultimately allows the corporations to tailor messages that are most likely to affect the decision-making process. Individuals do not have and cannot afford access to such data, and therefore to such knowledge. Further, a “structural asymmetry” is created because the hardware, software, networks, and legal frameworks are designed to be opaque to users and transparent to network/data owners (Andrejevic 2013). This data/knowledge gap forces us to rethink

traditional notions of privacy. Companies can use information about individuals to craft persuasive messages that can be customized to a single individual. The ability to draw on such massive amount of information and create custom messages gives companies the ability to create manipulative messages on the individual level, all without the individuals being able to tell that the message and design has been customized or whether and what information about them has been used in crafting such a message.

The Waning Efficacy of Privacy Protection

Digital technology's datafication of society has long been characterized as a threat to privacy. U.S. President Barack Obama (2014) called for an overview of big data and surveillance in light of Edward Snowden's revelations regarding the National Security Agency's use of data for spying, casting the debate in just such a way: "The challenges to our privacy do not come from government alone. Corporations of all shapes and sizes track what you buy, store and analyze our data, and use it for commercial purposes." The discussion about the death of privacy is merely a red herring that masks a much larger argument about the changing character of the risks stemming from the power differential created by corporate control of information (Andrejevic 2002; Andrejevic 2004; Mayer-Schönberger and Cukier 2013). The nature of privacy has undergone a fundamental shift in the age of big data, and this shift requires a new way of thinking about how we access and control such information.

Historically, concern about data has been focused on its primary use, which occurs when an individual's data is used to make a decision specifically about that person. A

traditional example of this is the way credit ratings are used to make lending decisions. When a bank is determining whether or not to lend money to someone, they will consider that person's individual, personal credit history. Insurance companies, on the other hand, tend to rely more on secondary uses of information. If statistics show that young males tend to get in accidents most frequently, then the insurance company might charge higher rates to all young males, regardless of individual driving histories. Big data's most innovative insights tend to greatly extend these secondary uses of data, often by discovering unintuitive correlations. To take a hypothetical example: perhaps a mortgage company buys access to information about the web browsing habits of consumers and determines that shoppers who most often abandon their virtual shopping carts without completing a purchase are actually more likely to make mortgage payments on time. This information could then potentially be used to offer lower loan interest rates for certain consumers. In this example, information collected in one context is being used in an entirely new context—a context that might not have been imagined when the data was collected. The groundwork is currently being constructed for even more decisions to be made this way. Hiring managers have used big data to determine that job applicants who use Internet Explorer to submit their applications are weaker candidates, and Facebook is preparing infrastructure that would allow loan companies to decline a loan request based, at least in some part, on the credit score of one's Facebook friends (Bhattacharya 2015; Corcodilos 2014).

This shift from primary to secondary uses of data represents both the best and worst possibilities opened up by big data. Much of the popular reporting on big data tends to focus

on privacy violation issues. Following our hypothetical example, one might argue that personal web browsing habits are private and should not be a factor in determining interest rates on loans. However, big data offers many opportunities for insights from secondary uses of data that can undoubtedly benefit society, such as predicting flu outbreaks, preventing fires in New York City, fraud prevention, and medical research (Mayer-Schönberger and Cukier 2013; Cate and Mayer-Schönberger 2013).² Preventing secondary use in order to protect privacy would also eliminate the many beneficial uses of secondary data analysis. Additionally, traditional privacy laws that focus on the anonymization of data and the enforcement of notice and consent cannot prevent the negative uses of secondary data analysis.

One of the surprises of big data has been the ease with which it is possible to de-anonymize data. Mayer-Schönberger and Cukier (2013) offer two such examples involving anonymized data from Netflix movie ratings and from old AOL search history. Anonymous Netflix ratings cross-referenced with named users on the IMDB.com website allowed for the Netflix user to be identified with only a few obscure ratings. Perhaps even more surprising was the ability of the *New York Times* to use AOL's anonymized search data to identify a particular person. They “cobbled together searches like ‘60 single men’ and ‘tea for good health’ and ‘landscapers in Lilburn, Ga’ to successfully identify user number 4417749 as Thelma Arnold, a 62-year-old widow from Lilburn, Georgia” (Mayer-Schönberger and

² It's also important to acknowledge the existence of growing body of research on the lack of effectiveness of predictive analytics such as that by Andrejevic and Gates (2014) regarding the security uses of data and Lazer et al. (2014) on the problems with Google Flu Trends.

Cukier 2013, 154). Demonstrations such as these help us understand that as the amount of data increases, the ability to effectively anonymize the data decreases.

Notice and consent offers another strategy that has been complicated by the change in the quality of the risk wrought by big data. U.S. laws related to notice and consent are largely based on resolutions created in 1980 by the Organisation for Economic Co-operation and Development (OECD) Privacy Guidelines. These guidelines offered the now standard model that requires users to be notified, usually during the sign-up process for a service or website, about what data will be collected and how it will be used. Yet, these guidelines have given rise to a proliferation of extremely long and technical privacy policies and notices, that by one account would take 76 working days for the average person to read all of those which applied to their activities (McGeeveran 2014, 68–69). In 2012, Microsoft hosted a summit that brought together leaders across industries and disciplines to discuss the new challenges to privacy laws and possible ways to update the original OECD guidelines. The efficacy of notice and consent in the face of big data was challenged, argue Cate and Mayer-Schönberger (2013), primarily because in the context of the way big data is used, its value is not clear at the time it is collected, when notice and consent is normally required. Going back and getting consent from past users would be both costly and cumbersome, potentially preventing important benefits to both individuals and society that may stem from future uses of such data. Finally, they note that data is collected so often, it would be a burden to users to ask them to consent so frequently (76-68). Notice and consent practices greatly hinder the secondary uses of data and the benefits that these uses offer. Big data is valuable precisely

because it can combine data in new ways that were not known at the time of collection.

Giving a robust notice that effectively explains all of the ways in which a website will use collected data is actually quite challenging.

Most major websites use third party analytics software and/or advertising systems, which call for some exchange of user information if these tools are able to function at all. In light of these additional flows of data, truly informed notice and consent becomes even more improbable:

To make an informed choice, users must fathom: (1) Which actors have access (which is not at all obvious); (2) What information they have access to (which varies significantly across actors); (3) What they do or may do with this information; (4) Whether the information remains with the publisher or is directly or indirectly conveyed to third parties; and (5) What privacy policies apply to the publisher as compared to the all the third parties, assuming these are even known to the users. (Barocas and Nissenbaum 2009, 5)

The flow of data facilitated by modern advertising platforms alone complicates the notion of notice and consent to such a degree that it is rendered nearly, if not completely, ineffective.

For example, Barocas and Nissenbaum (2009) discovered that the *New York Times* website shared data with at least 14 other organizations as part of their web service platform.

Participants in the Microsoft summit were unable to determine any clear changes to the privacy guidelines that would allow for these secondary uses but still provide an effective

protection to a traditional understanding of privacy. What are some possible protections that have been suggested?

In his earlier book *Delete*, Viktor Mayer-Schönberger (2009), in discussing the importance of forgetting, suggested that data should be created in such a way that it automatically deletes itself at some point in the future. This may be part of the initial notice and consent process between a consumer and service, but it could also be built explicitly into all files. For instance, when saving any file on one's own computer, a user could be prompted to enter an expiration date—a date that the file will automatically delete itself.

Though this proposal offers an interesting and creative solution, it is not ultimately effective. As Mayer-Schönberger (2009) himself suggests, the power divide between users and companies would likely nullify the effectiveness of such a change. Even now, most notice and consent operations have turned into a binary choice: either consent to these terms and conditions or do not use the service at all. Without inducement through legal structures, companies could easily extend the deletion period of data to such a length that it ultimately defeats the original purpose of the deletion. If Facebook, for example, set a deletion period of 100 years, then most of the data uploaded would likely outlive its source. Such increasingly long legal time frames can already be witnessed in copyright law through measures such as the Sonny Bono Copyright Term Extension Act (Lessig 2002). Yet, even if laws were changed to mandate shorter deletion periods of five, ten, or even twenty years, this process of deletion would negatively affect the many potential benefits of big data in much the same way as requiring companies to obtain consent for all future uses of data. Medical records

being collected today could potentially be the data that allow for a cure to cancer to be developed thirty years down the road. The point is that we simply cannot know ahead of time exactly which data will be important and relevant.

In Mayer-Schönberger's (2013) more recent book *Big Data*, this notion of deletion is no longer present. Instead, he and his co-author Cukier suggest that we shift away from notions of protecting privacy to instead legislating responsible use of data. This shift in perspective also mirrored proposed changes to the OECD Privacy Guidelines that were discussed at the Microsoft summit (Cate and Mayer-Schönberger 2013). In the first guideline, the limits on data collection, as well as the requirement for notice and consent of the subject are removed. In the third guideline, the specification of the purposes for which data is collected is removed, instead requiring that the purposes be lawful and available to users should they choose to look them up. In the fourth guideline, the uses of data are expanded nearly infinitely, so long as they are not harmful or inappropriate, as deemed by "society." In no case can consumers actually take action regarding the uses of their own data.

These shifts reflect exactly the change from the framework of privacy to power that Andrejevic (2013) has argued. Rather than truly being guidelines for protecting the privacy of consumers, they instead more closely resemble guidelines for managing the power wielded by corporations. Interestingly, these guidelines are still framed in the context of privacy. Though these suggestions certainly move the conversation about updating the guidelines in a helpful direction, they are, on at least one level, still not very realistically useful. Much of the data storage and processing is now done in the cloud, meaning through

distributed computing. Big data projects are especially likely to be done this way because individual computers are often not powerful enough to process such large amounts of information, giving rise to services such as Apache's Hadoop, which offers just such distributed computing. Cloud computing, in combination with website services being distributed to so many third-party organizations, means that data flows are frequently crossing many different borders spanning organizations, nations, and most importantly, legal frameworks. Even if the United States were to create strong laws as a dissuasion to using data, it seems likely that data-reliant organizations would find a welcoming home in other countries with less strict laws. This process might, for instance, mirror those transformations in online gambling. Though illegal in the US, the servers are hosted in other countries and still relatively accessible by US citizens (Stewart 2011).

Perhaps the most practical suggestion for how to deal with these changes is the one that simply gives up on notions of privacy protection altogether. Adam Thierer (2014) suggests that education efforts related to digital citizenship should model themselves after the awareness for online child protection efforts including "the importance of media literacy, awareness building efforts, public service announcements, targeted intervention techniques, and better mentoring and parenting strategies" (114). Thierer admits that these educational outreaches would simply help develop coping mechanisms and usher in new social norms. Rather than attempting to rescue privacy, this strategy helps make the public more aware of how data is being used, which is doubtless a laudable goal. These discussions make it clear that traditional ethical frameworks related to privacy are no longer effective due to the

extended uses of big data. More recent work, therefore, moves away from an ethical framework related to privacy and instead focus on the issues related to power.

The Growing Power Gap

Despite events such as Microsoft's Privacy Summit and Stanford Law School's Big Data and Privacy Workshop, no true privacy protections have emerged that also leave room for the beneficial uses of big data. Our traditional notions of privacy seem archaic from this perspective. While there will likely remain a place for laws to protect the most egregious privacy violations, notions of what we consider private are undergoing significant change. What we are left with instead is the difference in power between those who have access to data through structural asymmetry and those who do not. Who has access?

Big data sensors and big data pools are predominantly in the hands of powerful intermediary institutions, not ordinary people. Seeming to learn from Arab Spring organizers, the Syrian regime feigned the removal of restrictions on its citizens' Facebook, Twitter, and YouTube usage only to secretly profile, track, and round up dissidents. (Richards and King 2014).

Here the apparently open and liberating tools were used instead as a means of surveillance. Yet, the use of social media by protestors is a continually evolving battle. More recently in Kiev, cell phones were used as means to identify protestors in a specific geographic region and send an ominous warning. Rather than the hoped-for chilling effect of this message, it seemed instead to further fuel the embodied protests.

How might this struggle play out down the road? Andrejevic (2013) offers an example of a potential worst-case use for big data:

At its most dystopian, the resulting information landscape is one in which those with access to the database can derive practical, if probabilistic (“post- comprehension”), knowledge about how best to influence populations while members of these population are left with an outmoded set of critical tools that, in practice, can be pitted against one another’s worldview, but which have little purchase on the forms of knowledge turned back upon them by database-driven apparatuses of influence. In somewhat more concrete terms, this dystopia would be one in which political parties, for example, might use giant databases to exert influence in the affective register (by determining which appeals result in triggering desired voting behavior), overleaping the tangle of “reality-based” policy analysis, verification, and so on. This asymmetry would free up politicians to engage in “infoglut” strategies in the discursive register (promulgating reports that contradict themselves endlessly, pitting “expert” analysts against one another in an indeterminate struggle that does little more than fill air time, or perhaps reinforce preconceptions) while simultaneously developing new strategies for influence in the affective register. Fact-checkers would continue to struggle to hold politicians accountable based on detailed investigations of their claims, arguments, and evidence, while politicians would use data-mining algorithms to develop impulse- or anxiety-triggering messages with defined probabilities of success. (154)

Andrejevic (2013) imagines a future where big data driven decision-making is able to sway easily the population at large without their having realized it. The growing power gap is potentially of much larger concern than lost privacy. Behind the scenes, politicians would be pulling the strings that actually drive actions, while the public sphere as we might understand it today would be filled with talking heads that serve only to further confuse the true state of things. One might just as easily imagine corporations using big data in the same way—finding the best ways to sell new products by commodifying data collected from consumers. Practices such as these are already happening today, but the data-gap is one that continues to grow larger. How can we better understand this power discrepancy?

Power-Knowledge Approach

This pivot towards understanding big data through the perspective of power rather than privacy attempts to apply a Foucauldian framework (Andrejevic 2013, Siegworth and Tiessen 2012; Galloway and Thacker 2007). Andrejevic argues that the privacy framework tends to individualize the discussion around disadvantages created by big data because the concept of a collective privacy does not make sense; whereas, on the other hand, power lends itself to collectives and allows groups to ask how they can recognize their shared interest in contesting forms of disadvantage. (Sylvia IV and Andrejevic 2016). However, Andrejevic is skeptical of the continued link between power and knowledge:

There is, in Foucault, the evidence-based argumentation of the happy positivist – the conserved understanding that it is possible, with enough evidence, to intervene in the

functioning of established truths and the power that promulgates them...

Nevertheless, the critical apparatus invoked in this formulation depends upon the argumentative purchase of such evidentiary claims. (Andrejevic 2013, 134)

Stated another way, Andrejevic argues that the decline of symbolic efficiency means that it is now more difficult for knowledge to speak truth to power: "Power no longer promulgate themselves through generating dominant narratives that can then be challenged or otherwise retooled. Power could propagate itself by pointing out the inefficiency of knowledge itself," (Sylvia IV and Andrejevic, 3235). Andrejevic (2007) elsewhere describes this loss of symbolic efficiency as a poor interpretation of Foucault's claim that all truth is involved in strategies of power—"the reduction of truth to strategy pure and simple." Argument loses its efficacy when truth is interpreted as nothing more than strategy.

Despite disagreement over whether this decline in symbolic efficiency is actually occurring, it is clear that digital media have facilitated the ability to create and share an increasingly large number of narratives. The nearly infinite variety of narratives that emerge create a situation where there is so much noise, and resistance to any claims of truth, that no particular argument is capable of challenging power. This notion crystalized for Andrejevic as he watched Colin Powell's 2003 speech to the United Nations as a way to justify the Iraq war:

I remember... thinking at that time that knowledge has become disarticulated from power. This is pushing it far, but I remember thinking there's quite a lot of information out there at the time and if you were following it you could quite easily

interrogate the narrative that was being promulgated there. But it became clear that it didn't really matter what the narrative was. He was performing an outdated function.

(Sylvia IV and Andrejevic 2016, 3235-3236)

Proving Colin Powell's narrative wrong, or speaking truth to power, in this case would not have prevented the invasion of Iraq by the U.S. This decline in symbolic efficiency is reflected clearly in anti-vaccination and climate change denial movements (Offit 2011; Washington and Cook 2011). The multiple discourses generated around each issue multiply into irrelevance, leaving a power gap potentially insurmountable through discourse knowledge. This power gap is only broadened by the gap between those who have access to the infrastructure that allows for data mining and predictive analytics through the use of big data, and those who do not (Andrejevic 2013). Rather than worrying about notions of truth, those with access to big data can make use of correlative analytics that would allow them to most easily persuade consumers or voters, for example.

If Andrejevic is correct in this assessment, Foucault's oeuvre may have little to offer to contemporary approaches for thinking about big data; however, before abandoning this approach, it might be possible to tweak or supplement the traditional power/knowledge approach. For example, Andrejevic suggests that a new approach to knowledge may be necessary: "we need to find a way of re-inscribing (suppressed) forms of knowledge back upon the new ways of knowing being associated with the database/algorithm assemblage," (2013, 165). While this path may prove useful, I would suggest a second strategy that acknowledges what Andrejevic's approach leaves out: the third element of Foucault's

tripartite schema of power, knowledge, and *the production of the self*. Such an approach, though, is best explicated through an affirmative turn in critical theory. In the next section, I will explain what such a turn entails, why it is needed, and how it can clarify the role of big data in the production of the self.

An Affirmative Turn

Most of the traditional critical and cultural theory approaches do not adequately address the challenges of big data because they rely on the neoliberal conception of the individual subject. Attempting to address the challenges of big data with the implied ontological assumption of an individual subject creates a false problematic, which is alluded to above by Andrejevic. The intimate links between so-called humans, machines, and data can now be seen so clearly that attempting to sort out some specific individual that is able to maintain some certain standard of privacy no longer makes any sense – if it ever did at all. In other words, Andrejevic is correct that the notion of collective privacy is meaningless, but the problem is worse than he imagines. Through the affirmative turn, we can see that this collectivity is systemic at an ontological level. We are all collectives, at the most only ever metastable. Chapter 4 addresses this ontology and the process of individuation in more detail. While Andrejevic's power approach is not necessarily tied to the traditional neo-liberal model of the individual, it has instead simply not addressed processes of subjectivation that remain important to discussions of big data.

An affirmative turn within critical and cultural theory is of vital importance, especially for theorizing big data, because it allows for a belief in and passion for changing the negative, which facilitates the answering of Braidotti's (2014) call to be worthy of what happens to us. Stephen B. Crofts Wiley (2005) argues that this affirmative shift, particularly in the context of its monist epistemology, will help cultural studies disengage from a debate "characterized by endless cycles of deconstruction that repeatedly postpone constructive theoretical development," and allow cultural studies to "shift intellectual energies and academic resources to more pragmatic theoretical and analytical work, to more active and ethical political composition, and to renewed engagement with the public and the popular," (73). Similarly, Tony Bennett (1998) highlights the important effect that Foucault's work has had on the field of cultural studies. Traditionally the discipline followed a Gramscian model of analysis that was "little concerned with the specific properties of particular cultural institutions, technologies, or apparatuses, preferring to look through these to analyse a process (the organisation of hegemony)," (69). However, Foucault demonstrated cultural resources are always already intertwined with cultural technologies. This effect highlights the increasing importance of technology in understanding the human condition. When Foucault's emphasis on technology is combined with the monist ontology of an affirmative turn, a new assembled subjectivity emerges that no longer distinguishes clearly between technics and the so-called human, offering a method and ethics that insists on experimentation with processes of subjectivation.

This affirmative approach embraces the relation to non-human forces and focuses on the gradual co-creation of qualitative changes based on the ontology of relationality. It also emphasizes a new way of understanding the non-unity of a self-organizing subject and subjectivity as simply the effect of constant flows of in-between power connections (Deleuze [1968] 1990a). These power connections occur at both the macro and micro levels of the body, and are mostly induced by technology, blurring the boundaries between humans and machines at all levels. These subjects are desiring machines because they express impersonal forces and intensive resonances that demonstrate a desire to connect and endure in the bond of others. Braidotti (1994) explains that the Nomadic consciousness has its roots in Foucault's notion of counter-memory in the way that it resists the dominant ways of representing the self, instead insisting that no form of identity is permanent. This does not mean that a subject is a complete fluidity without borders, but rather that it maintains an awareness of the malleability of all borders. It also does not entail moral relativism, which is how many have interpreted post-structuralist and posthumanist moves. Rather, the ethical idea reflects a Spinozist ethics that seeks to increase one's ability to enter into modes of relation with multiple others.

Further, generating new political and ethical approaches from this understanding of the subject, Braidotti (2011b; 2013) argues, requires taking seriously Guattari's ([1989] 2008) three fundamental ecologies of the mind, society, and environment, calling this ecosophy a vitalist ethics of mutual trans-species interdependence. Environmental ecosophy will fully recognize the way that society affects the planet, focusing on the interconnectivity

and balance of various systems and networks. Social ecosophy focuses on reimagining the ways individuals live together, from the level of the family all the way up the largest urban centers. Within the realm of mental ecosophy, Guattari is particularly interested in challenging Integrated World Capitalism's mass-media generated subjectivity that leads to "telematic standardization, the conformism of fashion, [and] the manipulation of opinion by advertising, surveys, etc.," (24). This will entail a new understanding of the relation of the subject to the body and the processes of subjectivation. Braidotti reiterates the importance of seeing the interconnections between these areas by understanding, for example, the connections between the greenhouse effect, the status of women, racism and xenophobia, and frantic consumerism.

In light of such a task, Nomadic ethics recasts the subject in a materially embedded responsibility for the environment(s) which one inhabits. This entails a shift to thinking that is based in terms of processes rather than fixed entities, on Becoming, and on deterritorialization (Braidotti 2013; Deleuze [1990] 1995). Practically this will involve the process of cartography, which entails understanding one's own location in order to unveil the power locations which structure the subject-position, which draws heavily on a Foucauldian understanding of power-knowledge relations. Resistance takes the form of empowering and enhancing what a subject can do (*potentia*) for the sake of non-profit. Braidotti (2013) explicitly cites her criteria for this new ethics of a process-oriented subject that requires a continual experimentation with intensities: "non-profit; emphasis on the collective; acceptance of relationally and of viral contaminations, concerted efforts at experimenting

with and actualizing potential or virtual options; and a new link between theory and practice, including a central role for creativity,” (191). The emphasis on non-profit efforts is important because contemporary capitalism is itself focused on the production of subjectivities. To escape social subjection within the capitalist regime, resistance and new experiments with processes of subjectivation cannot have profit-making goals at their core. Put into practice, such criteria will allow citizens to participate in planning, assessing, and managing urban environments through access to open source, open data, open governance, and open science, all of which are enabled through one’s relation to media. By focusing on these media relations in combination with connections to others, agency is not dependent on the current state of affairs, but is instead geared toward creating possible futures through resources that have been left untapped.

Counter-Actualization

Gilles Deleuze ([1969] 1990b) develops an important methodological and conceptual approach for this affirmative turn in *Logic of Sense*, where he explains that

...to become worthy of what happens to us, and thus to will and release the event...

The actor thus actualizes the event, but in a way which is entirely different from the actualization of the event in the depth of things. Or rather, the actor redoubles this cosmic, or physical actualization, in his own way, which is singularly superficial – but because of it more distinct, trenchant, and pure. Thus, the actor delimits the original, disengages from it an abstract line, and keeps from the event only its contour

and its splendor, becoming thereby the actor of one's own events – a *counter-actualization*. (149-150)

For Deleuze an event is understood as a point of change or difference within a series of relations. It is not something entirely new, but gestures in new directions or changes in intensity. An event might be a plague, war, wound, or a surveillance, for example. Any event changes the relations among many different series – the multiple arrangements of states of affairs, words or propositions and other events.

This takes on a concrete example for Deleuze in the figure Bousquet, who affirms the event by accepting the war and his wounds and even his inevitable death, and then counter-actualizes them by transforming them into a theme for his artistic work. This process requires two steps, but through Deleuze's ([1962] 1983) reading of Nietzsche, these steps imply one another. First, one must affirm the event by learning to will it. However, affirming is itself an act of creation as opposed to mere acceptance or bearing: "Affirmation constitutes becoming-active as the universal becoming of forces. Reactive forces are denied, all forces become active. The reversal of values and the establishment of active values are all operations which presuppose the transmutation of values, the conversion of the negative into affirmation," (176). It is through this process of creation that the event is then counter-actualized. In the process of creating one remakes the event, recasting it, like an anti-God, in one's own image.

Counter-actualization rests at the core of an affirmative turn. Where critical theory carefully explores the intricacies of an event by fully understanding and critiquing the current state of affairs, affirmative theory instead compassionately witnesses the event but moves

forward seeking to counter-actualize it. One removes the power of reactive *ressentiment* by becoming-active. This could take the form of Bousquet's artistic re-appropriation of the wound or Félix Guattari's experiments with guerrilla radio. Guattari's work with radio operating outside of state control helped prepare broadcasting facilities that could be used to quickly intervene when special circumstances arose, such as a strike with a factory occupation (Guattari and Rolnik [2000] 2008). This type of use is "inverting the use that's foreseen in the construction of the device; it's transforming a receiving device into a broadcasting device," (Arlindo Machado in Guattari and Rolnik [2000] 2008). More specifically for this project, it might be creating approaches to using big data for novel, innovative and nonprofit practices.

Moving from the Neoliberal Individual to the Posthuman

Such an approach is needed precisely because it avoids the false problematic of privacy and the individual. An affirmative turn will allow one to create a problematic approach to big data and the posthuman that acknowledges the inherent metastable posthuman and its many a-signifying material relations with data – concepts that will be developed and explored in depth in later chapters. As the pace of technological change continues to grow, a full in-depth analysis of the problems created by any particular technology becomes an act of history in addition to active critique. By the time such a critique is complete and has moved through a peer-reviewed publishing process, the technology itself has already changed, adapted, and moved on. Affirmative theory more

directly inserts itself into this process by seeking to actively influence the changes and adaptations of the technology. It becomes part of the process through experimentations seeking to create new understandings of what posthumans can do.

Entirely new problematics are generated in this process. Rather than beginning from an assumed static notion of subjectivity, such an approach seeks to understand how data-body articulations (the combination of bodies and material data) generate new processes of subjectivation. It begins with a radically immanent philosophical nomadism that embraces a “dynamic process of unfolding subjectivity outside the classical frame of anthropocentric humanistic subject, re-locating it into becomings and fields of composition of forces and becomings,” (Braidotti 2002, 229). Thus, the nomadic subject is one that is understood as constantly in flux. Not only are fields of composition of forces and becomings explored cartographically, but they also serve as a site for experimentation where one generates new processes of subjectivation as a way of escaping the social subjection and machinic enslavement of capitalism (Lazzarato 2014). “The subjects’ fundamental aspiration is neither to ‘make sense’, that is to say emit meaningful utterances within a signifying system, nor is it about conforming to ideal models of behavior,” (Braidotti 2006, 126). Instead, the aim is to endure and to create new connections.

Understanding the subject in this way necessitates a completely different philosophical and methodological approach, from ontology through ethics. Although Deleuze’s concepts are certainly becoming more widely used in media studies, as well as other fields, a potential limitation of the work done thus far is that it often uses such concepts

selectively, without embracing or sometimes even acknowledging the underlying ontology on which the concepts rely. N. Katherine Hayles explains a particular instance of this limitation in an interview with Stephen B. Crofts Wiley: "The notion of assemblage as a concept is therefore a strong critique of preexisting subjectivity. The way I heard that term being used at the conference [Materializing Communication and Rhetoric: Technologies, Infrastructures, Flows] was something like this: 'We have these intact subjectivities and now we add in some technical objects and now we get an assemblage'" (Hayles and Wiley 2012, 24). The problem is that these approaches still hold onto a traditional notion of the neoliberal individual subject, while trying to shoehorn in the Deleuzian concept of assemblage. However, one cannot properly use the concept of assemblage in the same way as Deleuze without similarly adopting its critique of subjectivity. Embracing this affirmative turn within critical theory similarly requires a broad understanding and rethinking of the ontology, ethics, and methodologies with which it is associated.

While such an embrace would be important for any work within this affirmative turn, it is especially necessary when approaching the problematic of big data, because a Deleuzian ontology is born out of the inspiration of the ontology of Gilbert Simondon, which is linked with his project to rethink the concept of information. While at first blush big data may seem to be just one among many technologies that could be analyzed from such an affirmative perspective, I will instead show in the next chapter how, through the concept of information, it is intricately and intimately connected to the core of the ontological approach of difference and becoming that is central for Deleuze's philosophic project. Therefore, the importance of

big data is threefold: it shines a spotlight on the inability of critical theory to properly problematize new media in light of capitalism's social subjection and machinic enslavement, its link to information makes it a fundamental component of the ontological underpinning for alternative affirmative theoretical approaches, and, finally, it offers a rich context for exploring new processes of subjectivation as understood in terms of this alternative ontological approach. Thus far, we have explored the difficulties for critical theory in theorizing big data. The next chapter undertakes a genealogy of the relationship between the concepts of technics and information in order to better understand the contemporary relationship before suggesting the possibility of a new arrangement. This new arrangement begins in Chapter 5 by developing a framework for understanding how Foucault's work on subjectivity can apply to technics and information and is extended in the remaining chapters through the concept of the posthuman.

CHAPTER 4: A Genealogical Analysis of Technics and Information

“Information is a term that does not like history.” – John Durham Peters 1988

Often the history of the concept of information is mistakenly sourced back to its birth by Claude Shannon’s ([1949] 1998) *A Mathematical Theory of Communication* and the prolific field of cybernetics generated by this work. While Shannon’s conceptualization of information is certainly relevant and closely linked with the ideas of information and data that have proliferated through their now-common usage in relation to computers and networks, the concept has a much longer history that is closely integrated with the history of western philosophy, specifically as it relates to metaphysics and epistemology. Although this genealogy has been traced by authors such as Peters (1988), Capurro (2009), and Behrenshausen (2016), it has rarely been connected to a genealogical exploration of technics at the same time. A more detailed examination of these genealogies in tandem offers the possibility of rediscovering problem-spaces that could open up alternatives to the resource doctrine of information discussed in Chapter 2. By rethinking the concept of information, a genealogy will be able to help one better understand the current problem-space of information in order to create and arrange a new problem-space. Such a creation offers the opportunity to think about information and big data outside of the resource doctrine of information in ways that escape the predominately profit-oriented capitalist approaches. Furthermore, the concept of information has not been systematically linked with that of

technology in such an analysis. The relation of these two concepts over time opens new ways of thinking about each of the concepts and generates different approaches of understanding what it means to be human, or as Bernard Stiegler ([1994] 1998) argues, the “possibilization” of the past.

Peters (1988) traces the term “information” back to fourteenth-century use of the Latin *informare* (to instruct) and *informatio* (an idea, instruction, concept, or doctrine). Capurro (2009) offers a more detailed exploration of *informatio*, attributing to it two meanings, one metaphysical and the other epistemological: “the action of giving a form to something material’ as well as ‘the act of communicating knowledge to another person,” (128). The metaphysical definition of giving form to something material is linked closely to Aristotle’s notion of hylomorphism that conceives of being as being created by the combination of matter and form (Aristotle 1987). These uses, Peters explains, can be seen in Virgil’s description of Cyclops and Vulcan hammering out lightning bolts for Zeus and Tertullian’s description of Moses as one who molds people. Through this understanding, similar concepts can be traced back to the Greek philosophic concepts of *eidos* and *morphé* through the work of authors such as Cicero, St. Augustine, and Thomas Aquinas. For example, “Augustine calls in *De trinitate* the process of visual perception ‘the moulding of sensory perception’ (*informatio sensus*) (*trin* 11, 2, 3) pointing to the Platonic (*Theaet.* 191d) and Aristotelian epistemological metaphors (*De an.* 424 a 17) of the impression (*imprimitur*) of a ring seal into wax, i.e., into memory,” (Peters, 128). Aquinas similarly links Aristotle’s hylomorphism to the process of ‘in-forming’ matter (Peters 1988).

The genealogy developed in this chapter, while not exhaustive, aims to trace the relations of the concepts of information and technics through a number of major theorists in the history of philosophy as a way to propose a new relation of these concepts. Following the Deleuze/Guattari project of geophilosophy, I evaluate these concepts not in order to determine whether or not they fit within a history of truth, but rather to evaluate their consistency, the affects they produce, and the politics which they make possible, in order to redeploy the concepts on a new plane (Sauvagnargues 2016). Understanding the genealogical inscription of these concepts will enable their reconfiguration in light of the contemporary problem of capitalist capture of the subject. As we saw in the chapters 2 and 3, there are real-world problems related to big data and the subject, and their capture by systems of capital. Current conceptualizations of information and big data within the resource doctrine have offered limited solutions such as privacy and anonymization, which have lost their effectiveness in the age of big data. Such limitations create the need for a new approach. This project will create new conceptualizations of information and big data drawing on the work of the genealogy in this chapter. Finally, these new conceptualizations will be applied to the real-world problems with big data to offer new, more effective approaches.

This genealogy will begin with the founding of Western philosophy in the dispute between the Sophists and Socrates, contrasting their understandings of *eidos* and *technē*. It will then trace the changing meanings of these terms as they become solidified in Western philosophy through the works of Plato and Aristotle. Although some religious philosophers use these concepts during the Dark Ages, the next significant shifts in meaning occur at the

dawn of the Age of Enlightenment. I analyze the development of *eidōs* and *technē* as they develop in the work of rationalist René Descartes and empiricist Francis Bacon. Next I trace the development of these terms in the work of David Hume, because the shifts he makes in his use of these terms will have important implications for the later work of Gilles Deleuze. Next I show how the cybernetic approach understands information as a form of control, before finally exploring the Foucauldian approach that understands these concepts in terms of subjectivation, which will set the stage for my development of a concept of information in later chapters.

There are two developmental threads that we will follow. The first is the shift in the way that the term *eidōs* is understood as it changes from form to information. The second is the separation of the terms technique and technics from the Greek *technē* as a way of narrowing their meaning to limit it to only practical abilities divorced from the aspect of wisdom present in *technē*. With Michel Foucault, we will see the term technology used in a way that makes clear its role in wisdom, moving it closer to the original Greek usage. An important caveat is that the terms *technē*/technics/techniques/technology have not always been clearly separable. Some of the terms only arose in much later time periods to attempt to make a distinction. Where there may be some slippage between these terms, I have tried to stay true to their use in context of a particular author.

The Sophists and Socrates

Bernard Stiegler ([1994] 1998) locates the beginning of Western philosophy with its separation of *technē* from *epistemē*. Western philosophy arose as a different way of thinking at least in part due to the dispute between Sophists and those who would later come to be known as “philosophers,” such as Socrates and Plato. Much of this disagreement centers around the meaning of and importance of *technē*. The *Dissoi Logoi*, one of the longest surviving Sophist texts that was possibly authored by a student of Protagoras, addresses a man equipped with skills (*technē*) who is involved in an argument and knows how to argue correctly (Bizzell and Herzberg 2001). Although the main argument of this text appears to offer two contradictory positions, its use of *technē* can be understood as an important skill for argumentation in attempting to speak correctly, understood by both Sophists and philosophers as an important part of achieving *logos*, or knowledge. Cicero, a later rhetorician, uses *technē* in a similar way, explaining that he was “educated by Archias in *techniques* [*sic*] such as writing whose aim is to educate or ‘*in-form*’ young people in order to become a true human being (*quibus aetas puerilis ad humanitatem informari solet*) (Arch. 3)” (emphasis added, Capurro 2009, 128).³ ‘Technique’ is here translated from the Latin *artibus*, from the root *ars*, which could be more literally translated as ‘art’. However, this distinction also harkens back to the Greek *technē*, which has been translated in a myriad of ways including skill, craft, technique, and art. Here Cicero is linking technique (Latin *ars* or Greek *technē*) to its ability to in-form a person, similar to its use in Vergil. This specific

³ Stiegler ([1994] 1998) makes a similar connection between sophistic writing and the “tutoring” of the citizen (13).

linking of *technē* to the in-forming of a human being is rare in this history of philosophy, but will play an important role in the argument I later make for an alternative understanding of information and technology in light of a Deleuzian ontology.

The Sophists charged their students fees in return for teaching them how to use argumentation to support a particular position. This method can be seen in the few fragments of Protagoras' writing that survive, mainly through references in others' work. From these fragments, there are two primary arguments for which Protagoras is well known. First, he argues that man is the measure of all things, which has largely been taken as a highly subjective and anthropocentric argument. Second, Protagoras argues that there are always two arguments opposed to one another, and that one can make the weaker argument seem stronger (Schiappa 2003). Both of these arguments reflect Protagoras' belief that there is no single perspective that is absolutely correct, because truth depends on the frame of reference. This belief can be viewed as a direct contradiction to Socrates' quest to discover essential definitions for complex ideas such as justice and holiness in his conversations with Athenian citizens. For example, in the *Euthyphro* dialogue, Socrates, in trying to get Euthyphro to explain what holiness is, says: "I wanted you to tell me what is the essential form of holiness which makes all holy actions holy" (6d). While Socrates seeks this essential form of holiness that can be used to judge any particular action as either holy or unholy, a Sophist would reject such a possibility and instead argue that the holiness or unholiness of any action is dependent on the context of a specific situation, much as Euthyphro tries to do in his first definition of holiness, which is rejected by Socrates.

What is at stake in this disagreement is whether or not moral knowledge can be taught as a *technē*. David Roochnik (1996), in undertaking a thorough analysis of the Greek use of *technē*, argues that Sophists believe such teaching is possible, while Socrates, at least as portrayed in the dialogues written by Plato, does not. This view is substantiated by Socrates in his recounting of his discussion with Protagoras in the dialogue of the same name: “I know that if we could be clear about that, it would throw the fullest light on the question over which you and I have spun such a coil of argument, I maintaining that virtue was not teachable and you that it was” (360e-361). To see why this distinction regarding *technē* is important and how it relates to the Greek concept of *eidos* as it pertains to information, we must further explore Plato’s metaphysics.

Plato's Transcendent Forms

Plato’s work is situated historically as both a continuation of Socrates’ project aimed at finding essential definitions and a response to the Sophists’ emphasis on the subjective nature of truth. In response to this subjectivity, Plato metaphysically formalizes Socrates’ search for essential definitions through his creation of the concept of Forms or Ideas (*eidos*). These Forms should be understood as a type of pattern, template, or blueprint in which all of reality must partake. We can see this clearly in the language above that Plato has Socrates speak in the *Euthyphro*: “I wanted you to tell me what is the essential *form* of holiness which makes all holy actions holy” (6d. emphasis added). The Forms have several characteristics

that are identifiable through dialogues that include *Euthyphro*, *Phaedrus*, *Symposium*, *Republic*, *Parmenides*:

1. Perhaps most importantly from a metaphysical perspective, they exist apart from particulars in the world. They are changeless, eternal, incorporeal, and accessible to reason but not senses. Beauty is the only exception, because it is available to the senses and actually begins the process of understanding the Forms.
2. They cause particular things to be what they are. For example, the Form of Justice causes an act to be just. There are several theories as to what type of causation exists in this representation (Silverman 2002). One theory argues that particulars participate in Forms, though how this participation works is never made entirely clear. Another theory is that particulars imperfectly imitate the Forms, though this is problematic because it is not clear how an imitation of an incorporeal Form can take on corporeality, which is a key problem for dualist ontology, as Deleuze ([1968] 1994) argues in *Difference and Repetition*. The lack of a clear explanation for this causation will be an important factor in Aristotle's reformulation of Plato's theory of Forms.
3. Particular things are in flux, but Forms are static. Plato argues that if there is only flux, knowledge is impossible, therefore the Forms must exist.
4. The Forms have the characteristics that they give to particulars, *i.e.*, the Form of Beauty is itself beautiful.
5. Every Form is defined by an essential definition, which recalls the Socratic project.

6. There are different types of Forms, which means that there must also be a Form of Forms. For Plato this is the Form of Good. It is beyond being and nourishes everything.
7. One Form may contain others. For example, the Form of Animal contains the Forms of both Bird and Frog.

These characteristics of the Forms thus lay the groundwork of all of Plato's theory of metaphysics, clearly separating the Forms as a transcendent other entity that is separate from the everyday reality in which humans find themselves. These metaphysical characteristics of Forms, once understood, can also be seen to directly impact Plato's epistemology.

Plato explains his epistemology most clearly through his metaphor of the divided line (*Republic*). On one end of the divided line there is the visible realm that consists of opinion and reflects a world of constant change and flux. We have access to the visible realm through our senses such as vision and hearing. Understanding is a bridge between this visible realm and the intelligible realm, where the Forms are located. Knowledge and reason allow us to know the Forms, but this knowledge is attainable only through the mind rather than the senses. This epistemology has important consequences for the relationship of the *technē* to the Forms. Both art and craftsmanship, as multiple interpretations of *technē*, serve to actually move one further away from the knowledge of the Forms. It is not simply the content of the art, such as poetry, that is problematic, but also the nature of what *technē* attempts to do. The form that Plato criticizes is "*mimesis*," which translates to the English "mimesis" or "*imitation*". Plato uses the *Iliad* as an example of what exactly he means by imitation:

You know then that as far as these verses,

*And prayed unto all the Achaeans,
Chiefly to Atreus's sons, twin leaders who marshaled the people,*

the poet himself is the speaker and does not even attempt to suggest to us that anyone but himself is speaking. But what follows he delivers as if he were himself Chryses and tries as far as may be to make us feel that not Homer is the speaker, but the priest, an old man. (*Republic*, 393-b).

This imitation is problematic because it masks the truth. Plato believes the Forms are the real Truth, while the reality that we typically know is already once removed from that, and any work of imitation would then be two times removed from Truth. Similarly, if a wood worker were to craft a chair, this is merely a poor imitation of the Form of the chair because it only participates imperfectly in the ideal Form of the chair. It is only through the act of reason, and not that of *technē*, that one gains knowledge of the Forms. This is in contrast to the Sophists, for whom reason itself is a form of *technē*.

Difference from the Ideal Form is thus negatively understood. Plato sees actual things, and even worse, representations of actual things, as mere simulacra of their Ideal Forms. N. Katherine Hayles (1999) calls this the Platonic backhand and forehand, explaining how this ontological move allows one to distinguish between information and materiality even now:

They share a common ideology - privileging the abstract as the Real and downplaying the importance of material instantiation. When they work together, they lay the groundwork for a new variation on an ancient game, in which disembodied information becomes the ultimate Platonic Form. If we can capture the Form of ones and zeroes in a nonbiological medium - say, on a computer disk - why do we need the body's superfluous flesh? (11)

Hayles is critiquing some of the common versions of cybernetics that have arisen since the 1940s and have retained this Platonic dualism, upholding an idealist conceptualization of information. Plato believes that *technē* move us further away from the eternal Forms, and thus should be abandoned for a focus on the mind that seeks to know the Forms through the intellect. Although Aristotle also understands *technē* as something that interferes with the work of the mind, he takes a much different metaphysical stance on the nature of forms.

Aristotle's Hylomorphism

Aristotle, one of Plato's students, critiqued and extended his philosophic work. For Aristotle, Platonic Forms are not necessary to explain the nature of reality or the way in which we come to know that reality. Most concretely, we can see this in the case of a producer, such as an artist or a seed, which can cause forms in matter (*Metaphysics*). As producers, we move material into a form. Aristotle argues that there is no pure form without material, and pure matter does not exist without form. Although Aristotle is using the same term as Plato, *eidōs*, it means something that is entirely different metaphysically. Rather than

giving metaphysical priority to Forms, Aristotle instead focuses on what he calls individuals, which are the primary substances of reality and can be predicated in ten basic ways: essence or secondary substance, quality, quantity, relation, place, time, position, state, acting, and being acted upon (*Metaphysics*). Without any one of these predicates, we could not properly discuss any particular thing, because it is through these predications that we are able to identify individual things.

Aristotle (1987) expands on this system in his *Metaphysics*, where argues that there can be no science of individuals, though science can be applied to them, such as it is with medicine. Individual things are the primary substance. The secondary substance is the group they fall into, the patterns or forms within things. To determine the secondary substance, Aristotle uses genus and differentia. For example, man is in the genus animal, but we look to see what separates him from other animals (rationality, Aristotle argues). We can continue to find differences between things and break them down into smaller categories until finally we come upon things with no differences between them. Here we arrive at secondary substance. The last differentia will be the substance of a thing and its definition. One potential problem with this approach is that it is possible to narrow down individuals through differences all the way back to the individual level, such that determining where to stop generating differences is in some way arbitrary, blurring the distinction between primary (individuals) and secondary (form) substance.

Matter for Aristotle is uncreated, ungenerated, and eternal, in much the same way that Forms are for Plato. It is, simply put, what individual things are made of, or that which is

given shape and structure by form. For example, the matter of a boat is wood: its form is the design the boat builder realizes in the wood. We can also see through this example that form and matter cannot actually exist separately, although we can distinguish them in analysis. The metal silver is a matter that can be given a variety of forms such as a fork, spoon, bracelet, or ring. Through these examples we see that these forms are not external in the way that they were for Plato; instead being is seen as a compound of form and matter. The form *informs* matter. This understanding of the coupling of form and matter later comes to be called hylomorphism in an 1818 letter written by Friedrich Schleiermacher (Manning 2013). Aristotle utilizes this coupling to explain how both change and stability can co-exist. Change does not mean something comes from nothing. Forms and matter cannot change by themselves, but the way that they combine can be changed. If the combination of form and matter is altered, then there is change rather than stability during the time that the combination is altered. Though it will be critiqued for its hylomorphic nature, this emphasis on ontological change rather than the eternal stasis of Forms will be important for the model of coming into being, or becoming, for Gilbert Simondon and Gilles Deleuze. Most notably, Aristotle inserts the human as a mediator between sense and form, which constructs a system of inductive logic (Iliadis 2013a).

Much like Plato, Aristotle places a low value on *technē*; however, his reason for this is based on his system of ethics rather than metaphysics. In the *Nichomachean Ethics* Aristotle explains that the good life is achieved through excellence of character, which sets the correct goals, and practical wisdom, which determines the means for achieving those

ends. It is this practical wisdom that is most important for achieving the good life. Yet, even more important than this is theoretical wisdom, which consists of understanding how reality works. Aristotle explicitly lays out the hierarchy of wisdom: "... the man of experience is thought to be wiser than the possessors of any perception whatever, the artist wiser than the men of experience, the master-worker than the mechanic, and the theoretical kinds of knowledge to be more of the nature of wisdom than the productive" (*Metaphysics* 981b-30). *Technē* appears near the bottom of the list, while wisdom is at the top. He further argues that artisans have traditionally been slaves or foreigners, and the best forms government will not permit them to be citizens (*Politics* 1278a).

For Aristotle, then, the relationship between form and *technē* is almost identical to that of Plato. They both believe that true knowledge comes from understanding the nature of reality and grasping how things work. They also both believe that *technē* is not helpful in developing this knowledge and should, by and large, be relegated to those not interested in the intellectual life. Indeed, the only real difference is the ontological status of the forms. Whereas Plato sees Forms existing as part of a transcendent external realm, Aristotle sees forms as existing within primary substance as part of a coupling of form and matter.

Francis Bacon and Sense Information

With Francis Bacon's shift toward empiricism in the 16th century, the concept of information takes an important turn, as it was deployed to describe the actual process of sensation in which nature in-forms the senses (Peters 1988). As mentioned above, although

there is some use of the terms *eidōs* and *technē* during the Dark Ages, they reflect the work of Plato and Aristotle closely and there was not a significant change in their use until the beginning of the Age of Enlightenment. Bacon's use of the concept of information represents a shift away from the metaphysical usage of the term as it was leveraged by either Plato or Aristotle, while in some ways aligning more closely with Sophist rhetorical traditions that emphasized the epistemological sense of the term. Whereas for both Plato and Aristotle, form was something that helped shape nature, or reality, it loses this role within Francis Bacon's ([1620] 1986) empiricism. *Eidōs* instead becomes an active process of *in-forming*. This draws on the epistemological emphasis of the Sophists while at the same time extending Aristotle's insistence on change. Thus, it is with Bacon that we see the shifting usage away from *eidōs* as a form toward in-formation as a process by which nature, through sensory perceptions, shapes the human mind. In terms of John Locke's empiricism, we might say that the world informs, or impresses onto the blank slate that is the human mind at birth. Although Plato's Forms existed in a transcendent realm and Aristotle's existed in nature, both existed somewhere in the world, broadly defined. With empiricism, information is being shifted toward the human mind via the senses (Peters 1988). However, as we will see, Bacon ultimately ends up with a transcendent metaphysical version of forms and a method that aims primarily at learning to manipulate the contingent forms of nature; this is the first system within philosophy proper that allows for the possibility that nature also informs the human.

For Bacon's empiricism, information is the raw data that needs to be interpreted and understood through reason: "The information of the sense itself I sift and examine in many

ways. For certain it is that the senses deceive; but then at the same time they supply the means of discovering their own errors... The sense fails in two ways. Sometimes it gives no information, sometimes it gives false information.” (Bacon [1620] 1986, 24). To correct the difficulties with the senses, Bacon uses not instruments, but rather experiments, because their subtlety is greater than that of the senses. The central notion which ties together reason and science is method, or rules toward the direction of the mind, by which is meant logic. Bacon advocates for the role of inductive logic, as opposed to others such as Peter Ramus, who, a few years earlier argued that deductive logic plays this role. He develops a method of science that aims to systematically get rid of human biases by doing machine work that carries out its processes algorithmically. However, within a system of deductive logic, if it were possible to collect all of the information about everything in existence, then each instance would be unique and classified by itself; therefore no generalization would be possible. This is similar to the problems with Aristotle’s system of categorization.

Bacon instead argues for a method which is made better through the use of *technē*, understood by Bacon as the use of technology. In other words, senses give us information, but it is the *technē* that helps us find the form. We can aid sight through tools that enable us to see things not otherwise visible because they are too small, too far away, or not distinct (Bacon [1620] 2015). Information from technology is therefore both the most important and most accurate. Yet, some question still remains about the form which technology can help us understand:

...the forms of substances I say (as they are now by compounding and transplanting multiplied) are so perplexed, as they are not to be inquired; no more than it were either possible or to purpose to seek in gross the forms of those sounds which make words, which by composition and transposition of letters are infinite. But, on the other side, to inquire the form of those sounds or voices which make simple letters easily comprehensible; and being known induceth and manifesteth the forms of all words, which consist and are compounded of them. In the same manner to inquire the form of a lion, of an oak, of gold; nay, of water, of air, is a vain pursuit; but to inquire the forms of sense, of voluntary motion, of vegetation, of colours, of gravity and levity, of density, of tenuity, of heat, of cold, and all other natural qualities, which, like an alphabet, are not many, and of which the essences (upheld by matter of all creatures do consist; to inquire, I say, the true forms of these, is that part of metaphysic which we now define of. (Bacon [1605] 2001, 91).

Through this description we see two types of forms emerging, those that are of natural bodies and are contingent, and those that are metaphysical, which are simple and eternal. In this way, Bacon maintains some of the transcendence of Plato and separates physics and metaphysics. Natural bodies are simply made up of various combinations of contingent forms, and nature, as a whole, is only one contingent possibility of which there could be other formulations.

Despite this separation between the physical and metaphysical form, it is, in contrast with Plato, the physical form that is most important for Bacon, because he emphasizes its

utility. Man has the power to change nature to meet his own needs, and it is technology that allows him to understand nature and better manipulate the physical forms into new arrangements. Science becomes actually only a tool for the advancement of technology in the work of redesigning nature to better suit human needs. He says clearly that the first five parts of his work are subservient to the sixth, which is the technological project of reshaping nature (Bacon [1620] 1986). Additionally, he sees technology and nature as the same from the perspective of form and essence:

The artificial does not differ from the natural in form or essence, but only in the efficient, in that man has no power of nature except that of motion; he can put natural bodies together, and he can separate them; and therefore that wherever the case admits of uniting or disuniting of natural bodies, by joining (as they say) actives with passives, man can do everything; where the case does not admit this, he can do nothing. Nor matters it, provided things are put in the way to produce an effect, whether it be done by human means or otherwise. (Bacon [1620] 1986, 427)

Conflating nature and technology in this way not only allows one to apply mechanical understanding to nature, but it also opens up the possibility of changing and manipulating nature in the same way that mechanical objects can be manipulated for human benefit. In *New Atlantis* ([1627] 1980), Bacon envisions using technology to manipulate nature to make life better for humans through projects such as increasing the human life span. Therefore, although we see some emphasis on nature *informing* the human mind through the senses in this version of empiricism, this leads only to the human as the one that manipulates nature

from a privileged position. This privileged position of the human helps to cement an anthropocentric view of the subject. Overall, Bacon's work serves an important role in the transition from *eidos*, or form, to that of information, and from *technē* to technology.

Rene Descartes' Disembodiment

While Francis Bacon leveraged the concepts of information and technology for his empirical epistemology, René Descartes ([1637] 2001, [1641] 1993, [1644] 2010) was similarly adapting them in a different way for his rationalist epistemology. To better understand Descartes epistemological approach, some historical background is of help here. Plato's work influenced many church founders and ushered in an intense focus on the intelligible realm. For almost 1200 years after the closing of Plato's Academy, Western philosophy predominantly focused on the nature and existence of God. However, Galileo's use of the telescope at the beginning of the fifteenth century confirmed Copernicus' earlier theory that the Earth is not the center of the universe. This served to shake up very established views of the universe. Two years after the invention of the telescope, Kepler invented the double convex microscope, which opened up an entire microscopic world that we didn't know existed. Everything European history had shown to be true was cast into doubt through these discoveries.

Yet, the epistemological acceptance of these technical instruments was not immediately assured. The instruments would need an epistemology that explained exactly what these new visions were that these tools offered, and why they might increase one's

understanding of the world. Descartes was born in 1596, growing up in the midst of the turmoil caused by these inventions. Intervening in these discussions through his work on optics, Descartes ushered in much of modern philosophy, and especially epistemology. Further, his work signifies the shift from natural philosophy to many of the methods often still associated with contemporary science, such as the hypothetico-deductive method (Olscamp [1965] 2001).

In many ways, Descartes' insistence on systematic doubt makes sense in light of this historical context. If a large swath of received knowledge from the entirety of recorded history can be thrown into doubt by the invention of the telescope and microscope within a short period, it seems natural to wonder exactly what it is that one might be able to have certainty about, if anything. These inventions clearly demonstrated that we cannot trust our natural, unaided senses as a method of deriving truth about the world (Barrett 2014). Understanding how Descartes implemented this systematic doubt as part of his philosophy is important for grasping his development of the concept of substance. This concept is connected to the notion of information through its use by Aristotle, as well as his views on technology as they relate to his natural philosophy project that helps push the development of science into a type of inquiry separate from that of philosophy.

Bernard Stiegler ([2001] 2011) situates the beginning of the historical link between technics and objectivity with Descartes, who "constructs subjectivity as mastery over nature, where knowledge is the method whose instrument is technics," (172). Technology provides Descartes with the necessary instruments for gaining information about nature as part of his

work in the natural sciences. Although his work is sometimes taken as a strictly deductive system of science, he frequently uses physical experiments in works such as *Optics* and *Meteorology*, meaning that there is very little difference between rationalists and empiricists when it comes to the activity of science (Olscamp [1965] 2001).

Descartes claims that the management of our lives depends on the senses, and primarily sight, so the inventions that augment them, such as telescopes, are extremely useful. This is possible because, for Descartes, the laws of mechanics are the same as those of nature (Descartes [1637] 2001). Nature follows its own mechanical laws that can be understood through technics. Like Bacon, Descartes insists on the importance of utility for philosophy. Descartes ([1637] 2001) writes that these inventions “seem to have opened the way for us to attain a knowledge of nature much greater and more perfect than our fathers had,” (65). And yet, he also adds that the creation of telescopes hits the limits of what technology will be able to add to vision. Such a caveat is intriguing because while it carves out such an important place for technology, it also assumes that technology has already, in his own time, advanced as far as possible. Here his view of technology departs from Bacon, who instead envisions generations of technical improvement that will eventually lead to mastery over nature.

Despite this use of technology to master nature, Descartes inserts the concept of ideas between the direct perception of the intellect and nature as a form of representation (Peters 1988). For this reason, Descartes ([1637] 2001) must necessarily explain that it is the mind that senses rather than the body, because when in deep thought we lack sensation. Although

technics are well situated to help us better understand and master nature, Descartes maintains this strict separation of the human subject from both nature and the technical instruments. Such a separation appears as part of his methodological project of doubt and plays an important part of his overall philosophic project. This also explains why, despite emphasizing the role of technology in developing knowledge, Descartes is nonetheless just as dismissive of craft as Aristotle and Plato. In *Optics* ([1637] 2001), Descartes develops the plans for the tools but leaves the actual creation of the tools he designs to the craftsmen.

Descartes, drawing on the same language of substance as Aristotle, explicitly separates the mind and body as two different substances. In *Meditations on First Philosophy*, Descartes ([1641] 1993) describes sitting near a campfire where he observes a piece of solid wax. He notes things such as its texture, its smell, and its color. As he moves the wax closer to the fire each of these properties changes as it becomes a liquid and loses its smell and color. Yet, we can all still understand this liquid thing as wax. Descartes concludes that the only thing that remains the same is extension – the fact that both versions of the wax take up space. It is the thinking mind that allows Descartes to understand this connection in the first place. Further, Descartes realizes that he can reasonably doubt the existence of all extended things, or bodily substances, including his own body. However, he cannot reasonably doubt the existence of his own mind, because without a mind he would not be able to doubt in the first place. If the body is doubtable but the mind is not, then they must ultimately be different things according to the principle of the indiscernibility of identicals, because one has a property that the other does not. Again borrowing on language that dates back to usage by

Aristotle, Descartes posits that thought is the attribute of the mind, and extension the attribute of the body. This explanation of a fundamental ontological dualism fully entrenches the elevation of the mind over the materiality of the body.

Descartes therefore sees technology in much the same way as Bacon, with the notable difference that he uses the Aristotelian concept of substance to separate the mind and the body in a way that privileges the intellect over the material world. However, contrary to Bacon's emphasis on both physical and metaphysical forms, Descartes completely eliminates the concept: "To that end, let us expressly suppose that there is no form of earth, fire, or air, nor any other more particular form, such as the form of wood, stone or metal," (Descartes [1662] 1998, 22). All that exists is matter that moves according the mechanical laws determined by God. In summary, while Descartes places a high emphasis on technology as a way to help us understand the world, he downplays the importance of technics; at the same time, his dualistic separation of mind and body provides a philosophic undergirding for later approaches to information as disembodied.

David Hume and the Construction of the Subject

David Hume ([1748] 1996) takes the empiricism of Bacon and others and pushes it in a new direction, arguing that the information of the senses actually constructs the subject, breaking away from both rationalism and empiricism. This shift in the conceptualization of information makes a major step toward understanding the role of information in the process of subjectivation, and this argument will be used by Deleuze in developing his own theory of

subjectivation. First, Hume distinguishes between matters of fact and relations of ideas. Relations of ideas are a priori, known analytically through reason alone, *i.e.* $3 \times 5 = 15$. Matters of fact are a posteriori and need to be observed empirically or derived synthetically. Matters of fact cannot prove relations of ideas and relations of ideas cannot prove matters of fact. This division between these two ways of knowing would later be dubbed Hume's Fork, emphasizing the impossibility of crossing between matters of fact and relations of ideas. For Hume, nothing can be both certain and about the world, so nothing in the world is certain. This conclusion also has drastic consequences for induction; knowledge of unobserved matters cannot be derived a priori, yet this is the goal of induction. Eliminating induction as a path to knowledge would also remove many of tools of the scientific method and its related processes as they are commonly understood by both rationalists and other empiricists.

How does Hume develop this hypothesis? He begins with impressions, which are the flow of information from the senses. These are distinguished from ideas, which are created by the thinking mind based upon impressions: "By the term impression, then, I mean all our more lively perceptions, when we hear, or see, or feel, or love, or hate, or desire, or will. And impressions are distinguished from ideas, which are the less lively perceptions, of which we are conscious, when we reflect on any of those sensations or movements above mentioned." (Hume [1748] 1996, 10) This means that matters of fact cannot be proven true because we cannot observe the future; matters of fact rely on cause and effect, which are discoverable only by experience and cannot be known a priori. We have no reason to presume that because an object has behaved in a certain way in the past that it will continue to behave that

way in the future. Within this system, information becomes epistemologically untethered from an ontological reality. There are not forms that exist out there, either physically or metaphysically, that we can know. Instead, we experience only a subjective flux of images that are *in-formation*, or rather, information: “And as the power, by which one object produces another, is never discoverable merely from their idea, ‘tis evident *cause* and *effect* are relations, of which we receive information from experience, and not from any abstract reasoning or experience,” (Hume [1748] 1996, 96). Through this framework we can see that the contrary of every matter of fact is possible.

Rather than using the intellect to come to know forms, we instead create beliefs through the constant conjunction of experiences as a form of habits. Although these habits of belief can never be known with certainty, for Hume, they still provide a very good guide for one to use in thinking about how to live life or how to conduct science. Deleuze ([1953] 1991) characterizes this system of empiricism not as a philosophy of senses, but of the imagination, because the constant correction of the imagination is the task of understanding. The world is a fiction of the imagination. More importantly, for Deleuze and Simondon, Hume’s empiricism raises the problem of the creation of the subject rather than the origin of the mind: the mind is subjected. What is given is the flux of the sensible as information – everything that appears. “This confirms the idea that subjectivity is in fact a process, and that an inventory must be made of the diverse moments of this process. To speak like Bergson, let us say the subject is an imprint, or an impression, left by principles, that it progressively turns into a machine capable of using this impression,” (Deleuze, [1953] 1991, 113). Or put more

simply: “Subjectivity is then an impression of reflection and nothing else,” (113). Deleuze finds this helpful because he can use Hume’s understanding of impressions to explain the process that generates subjectivity, as opposed to Heidegger’s phenomenology which still requires an original, unexplained subject.

Though Hume himself did not write widely on technics or technology, he opens the path back to technology through information as the impression of sensation:

Another advantage of industry and of refinements in the mechanical arts, is, that they commonly produce some refinements in the liberal arts; nor can one be carried to perfection, without being accompanied, in some degree, with the other. The same age, which produces great philosophers and politicians, renowned generals and poets, usually abounds with skillful weavers and ship-carpenters. We cannot reasonably expect, that a piece of woolen cloth will be wrought to perfection in a nation, which is ignorant of astronomy, or where ethics are neglected (Hume [1752] 1994, 107).

Hume here links the *technē* of the mechanical arts to the production of great philosophers and politicians, at the very minimum suggesting that the mechanical arts *inform* the subject.

A.M.C. Waterman (1998) explains that this is likely one of the earliest arguments made for the causal connection between technology and culture, though Hume is lacking that precise language at the time of his writing. Instead, he refers frequently to the idea of *a state of productive technique subject to change*. Unfortunately, this association between technology and culture is not explained or expanded upon by Hume in any of his other writings.

However, we do get a brief glimpse of how this connection arises: “the two are held together

in any particular *state of society* created by the interaction of all the elements I have identified [general principles, contingency, human nature, reason, passions, self-interest, unintended consequences, monarchy/republic, civil liberty, commerce, luxury, agricultural surplus, technology, and culture]. This state Hume called ‘the spirit of the age’.” (Waterman 1998, 59, emphasis original). The technology that in part derives the spirit of the age thus also can be seen to inform the subject.

This solidifies a distinct break with both the rationalism of Descartes and the empiricism of Bacon. Descartes’ dual mind/body substances, like Bacon’s physical and metaphysical forms, are eliminated. Instead, a flux of always changing *information* itself, potentially always already altered by technics, constructs the subject. For Hume, information means only our sensory input – what we see, hear, smell, touch or taste. Everything we know is constructed from this flow of information by our senses. It is upon Hume, then, that both Simondon and Deleuze will draw for inspiration in the construction of their informational ontology. However, it is through Foucault that technics is most closely linked with processes of subjectivation.

Bureaucracy, Statistics, and Cybernetics

Before understanding how Foucault is able to link technics to processes of subjectivation, there is one last major shift in the understanding of information. The form of statistical analysis that arises as part of bureaucratic systems in the 18th and 19th centuries pushes information beyond the bounds of a single human mind’s sense perception and allows

one to “know something that they can never experience for themselves,” (Peters 1988, 15; Peters 2015). This was also facilitated by the technical capacity to transmit data electrically via telegraph in order to gather reports from distant sites, pool them in a central office, analyze the data, and then return the report to the peripheries. Statistics, Peters argues, fuel a bureaucratic explosion that allows the nation itself to become a knower, as opposed to a single individual; further, thanks to increased scale, this knower can now see things such as weather and rates of birth and death that were formerly imperceptible. Peters (1988) explains: “whereas in empiricism, *information* was nearly synonymous with *sense experience*, it comes with the growth of bureaucracies to mean *knowledge beyond the range of one’s experience*,” (15). With this shift, information is firmly removed from the scale of the individual and understood instead as something exterior, something out there. The state is now able to use information in the process of managing both people and property. Information itself, then, begins to be understood as a means of control.

The field of cybernetics pushes this notion of control through information to its full consequences. Norbert Wiener coined the term in his 1948 book, *Cybernetics; or, Control and Communication in the Animal and the Machine*, drawing inspiration from the Greek word *kybernan*, meaning to steer or navigate (Rid 2016). Ashby, writing *An Introduction to Cybernetics* in 1956, explains that materiality is irrelevant for cybernetics, drawing on an analogy to geometry. Just as geometry is not concerned with whether the forms and spaces it analyzes are in fact actualized, cybernetics is not concerned with whether the machines it considers actually exist, instead taking as its subject all possible machines. Methodologically,

the research question emphasizes all possible behaviors for a machine, thus connecting cybernetics to information theory, which from this perspective, deals precisely with the set of possibilities. Ashby ([1956] 2015) offers the following example:

Two soldiers are taken prisoner by two enemy countries A and B, one by each; and their two wives later each receive a brief message “I am well”. It is known, however, that country A allows the prisoner a choice from

I am well,

I am slightly ill,

I am seriously ill,

while country B allows only the message

I am well

meaning “I am alive”. (Also in the set is the possibility of “ no message ”.) The two wives will certainly be aware that although each has received the same phrase, the information that they have received are by no means identical. (124)

This example illustrates the importance of shifting one’s attention away from the message itself toward the larger set of possibilities afforded by the framework of information theory. This crucial link between the machines of cybernetic theory and the set of possibilities in information theory links together technology and information with the goal of *controlling* nature, expanding the vision of Bacon and Descartes for using technology to control nature. It also de-links information from the physical, technical media/machines used for calculations.

This Cartesian philosophical cleaving of the mind from the body, extending the work of Plato, paves the way for a practical understanding of a conception of being human that does not require embodiment. The coming of the computer age facilitated new ways to conceive of the possibility for the mind, or intelligence, to be separated from an original body through fantasies such as downloading a brain directly to a computer. The Turing test, created in an attempt to determine whether or not a machine had achieved artificial intelligence, erased embodiment by focusing on “the formal generation and manipulation of information patterns,” (Hayles 1999, xi). Formal communication models followed this same formula:

Aiding this process was a definition of information, formalized by Claude Shannon and Norbert Wiener, that conceptualized information as an entity distinct from the substrate carrying it. From this formulation, it was a small step to think of information as a kind of bodiless fluid that could flow between different substrates without loss of meaning or form. Writing nearly four decades after Turing, Hans Moravec proposed that human identity is essentially an informational pattern rather than embodied enaction (Hayles 1999, xi-xii)

When human identity can be characterized as an informational pattern, it is only a small Cartesian leap to imagine separating this information from its body. The dominant philosophic tradition of separating the mind from the body, combined with a digital interpretation of information as ones and zeroes, ultimately enabled a conception of information to develop that sheds the need for any requirement of embodiment. This also

links information to the Platonic concept of *Eidos*, in which the information (or the form) is more important than the physicality of matter. For example, the information of a mind might be transferred from a brain to a hard drive without change or loss. It is the information pattern – the form – that is most important.

This cybernetic framework for control is at the forefront of the technological explosion that has shaped the Information Age: “modern technics is dominated by cybernetics as the science of organization, in the largest sense, going back to the *organum* as instrumental to organization as characteristic of life,” (Stiegler [1994] 1998, 23). Just as Plato’s Forms organized reality by partaking in matter to form it, information can now be seen to serve a similar organizational role. It is through cybernetics that information and technology, *eidos* and *technē*, are clearly linked, due in large part to the immaterial and essentialized conception of information. Information is used to exert control. Passwords are the codes that indicate whether access should be allowed or denied. Deleuze ([1990] 1995) characterizes these changes as moving away from a disciplinary society that relies on confinement and toward the control society that relies on continuous control and instant communication.

This statistical model of cybernetics has been extended to the present day into the predominant social physics model of big data as a form of prediction and control. Pentland (2014) likens his work with big data as a way to understand social dynamics — a socio-scope — to the invention of the microscope and telescope that opened up a new way of understanding the universe in the 17th century. Now, instead of using the technics of

microscopes and telescopes to gain mastery of nature, the socio-scope functions as a technics that gains mastery over the behavior of humans, at least for those who are in a position to make use of it, as Andrejevic warns. With this connection in mind, we can now shift to Foucault, who offers a different way to understand the relationship between *technē* and *eidōs* that focuses on processes of subjectivation rather than control.

Michel Foucault and Subjectivation

Foucault uses the concept of technology quite broadly, as seen through the lens of contemporary philosophy of technology (Gerrie 2003; Packer 2012). This perspective conceives of technology as something that can be “associated with diverse human behaviors, with distinctions among them often less clear than for either artifacts or cognitions. Technological activities inevitably and without easy demarcation also shade from individual or personal into group and institutional forms,” (Mitcham 1994, 209, as quoted in Gerrie 2003). This understanding of technology as primarily an activity aligns well with Foucault’s own use of the term technology, and also calls back to the term’s Greek root and its emphasis on skill. It is through this emphasis on technology that Foucault (1997) is able to sidestep both the structuralist and analytic philosophic traditions by focusing instead on a genealogy of the subject as contingent. The link, therefore, between this understanding of technology and the subject as contingent is precisely what allows Foucault’s work to move in such different directions from the humanist critique of technology as a corruption of the essence of man, which, as Stiegler ([1994] 1998) acknowledges, would require a clear understanding of

what human nature is in the first place. Therefore, Foucault's use of technology is intimately connected with his anti-humanist philosophy, which provides a major foundational thread for postmodernism.

Before further exploring Foucault's conceptualization of technology, it is worth emphasizing that the word 'technique,' also rooted in the Greek *technē*, is used as a very near synonym for technology in French, which is a slightly closer relation than the two words have in English: "in French, the words 'technologie' and 'technique' are used more or less interchangeably to refer to technology, with the latter term being somewhat more general and more often applied to technologies that pre-date industrialization," (Chabot 2013, 22). The connection between these two terms is important for understanding the role of technology across the whole of Foucault's work, because he uses technique more frequently in his early works before he takes up the concepts of technologies of power and self in later work. I have drawn on Michael Behrent's (2013) article, which traces Foucault's use of the terms technology and technique throughout his oeuvre as a map for this analysis. For example, Behrent is able to point to several instances where Foucault clearly uses these terms interchangeably, such as his 1978 lecture, *La société disciplinaire en crise*: "My research deals with *techniques* of power, with the *technology* of power," (as quoted in Behrent, 59). Understanding the close connection of these two terms for Foucault allows us to link his later explicit discussions of technology to some of his earlier references to technique.

One important link between this work occurs in *Archaeology of Knowledge* (Foucault [1969] 2002). Although most of this book is devoted to knowledge (*savoir*) in relation to

discourse, the end of the work suggests that Foucault's methods can also be expanded to a wider variety of practical discursive practices, of which painting and its related techniques serve as the primary example. In other words, techniques/technologies themselves are understood as *savoir*: "In this sense, the painting is not a pure vision that must then be transcribed into the materiality of space; nor is it a naked gesture whose silent and eternally empty meanings must be freed from subsequent interpretations. It is shot through — and independently of scientific knowledge (*connaissance*) and philosophical themes — with the positivity of a knowledge (*savoir*)," (Foucault [1969] 2002, 214). Just an afterthought in *Archeology of Knowledge*, this relationship of technology to knowledge opens the door for the much greater role that technology will play in the development of Foucault's tripartite schema of power, knowledge, and subjectivity, harkening back to the Sophistic understanding of *technē*.

The later lectures at the College of France focus more explicitly on what Foucault (1997) outlines as four major types of technologies: production, sign systems, power, and self, which all work together and overlap in various ways to produce an individual. Much of his work in the 1970s related to technologies of power, whereas his work in the 1980s shifted further toward technologies of the self. The technology of power is a form of external domination that objectifies the individual, while the technology of self allows individuals to effect, by their own means, operations on their body. It is the intersection of these particular two technologies, power as an external influence and self as an internal influence, that

Foucault defines as governmentality and which plays a constitutive role in the process of subjectivation.

It is in the *Psychiatric Power* ([2003] 2006) lecture that we see Foucault explicitly connecting technology to power: “Discipline seems to me to be this technology, specific to the power that is born and develops from the classical age, and which, on the basis of this game of bodies, isolates and cuts out what I think is an historically new element that we call the individual,” (57). Here, Foucault links the technology of discipline to a certain conception of man through its co-construction of the subject with the body, which necessarily asserts the contingent so-called essence of man. This connection to discipline extends in many directions throughout Foucault’s work moving forward, from his explicit descriptions of the Panopticon as a technology in *Discipline and Punish* ([1975] 1995) to the power techniques employed by the sexual apparatus in *The History of Sexuality I: The Will to Knowledge* ([1978] 1990), which both emphasize the ability for technology to be used to constitute and manipulate individuals in ways that are more practical than ideology and more subtle than violence (Behrent 2013).

The shift toward bio-power in the 1978 and 1979 lectures tracks the changing emphasis of power toward security and social control that begins in the eighteenth century. Foucault ([2004] 2007) describes his work as undertaking a history of technologies of security, highlighting in particular the correlation between the techniques of security and population that gave rise to the modern concept of population. This represents the extension of study from the discipline of bodies to regulation of populations and allows him to define

man as a figure of population, again emphasizing the contingent status of so-called human nature. Additionally, this perspective gives us a place to understand Foucault's use of information. Peters (1988) argues "people who, thanks to statistics, 'see' something intellectually they could not see sensually, are put in a curious position. They know something that they can never experience for themselves," (15). For Foucault, biopolitics is the managing of populations precisely through such statistical information. Now, the forms related to information are, Peters says, "not the forms that fill us, but that we fill in: application forms, medical forms, insurance forms, tax forms..." (1988, 16). Though a clever play on words, such a perspective overlooks the role that biopower plays on processes of subjectivation and the *forming* of the subject. The form does in many ways in-form us.

The *Subjectivity and Truth* lectures, which serve as foundation for the *History of Sexuality 3* ([1984] 1986), explore technologies of the self through the question of how a subject is established by his or her own self-government, or self-care. The techniques of self are explored in these lectures as they relate specifically to sexuality and also serve as a way to understand such techniques as a method for completing a history of subjectivity. *On the Government of the Living* ([2012] 2014) marks a turning point in which Foucault moves away from technologies of power and begins to expand his analysis to technologies of the self, considering the production of subjectivity in Greco-Roman and Christian cultures. Moving beyond even these epochs, Foucault explains that there are a variety of ways that one can examine one's own conscience, which include the nature of the examination, the

objective, and the instruments, showing how both the Greco-Romans and Christians used these tools in a unique manner.

The role of the instrument in the process of examination of conscience and mode of subjectivation offer an opportunity for further exploration. Although Foucault gives the examples of concentration, memory, virtual discourse, confession, and writing for oneself or others, he acknowledges that such a list is not all-inclusive. Through this understanding of particular instruments within the larger framework of technologies of the self, there are potential connections to Stiegler's ([1994] 1998) work on memory and Kittler's ([1985] 1990) exploration of verbalization and writing in German literature.

Throughout these 1980s lectures, Foucault explores these different varieties of subjectivation, which previously had been obscured to him because of his emphasis on the eighteenth- and nineteenth-century production of the subject through knowledge and power. What becomes clear through this extended exploration of subjectivity, and of utmost importance for our understanding of the role of technology in this process, is how large of a role the technologies of the self play in the process of subjectivation. For example, in *Hermeneutics of the Subject* ([2001] 2005), Foucault links these forms of self-government in antiquity to the way one governs others, creating a broader political impact. The most important problem of our time, he argues, is not freeing individuals from an oppressive State, but rather promoting new forms of subjectivity through experimenting with technologies of the self. This prioritization, of course, links Foucault to Rosi Braidotti's posthumanist project that calls for similar experimentation.

This link becomes clearer in his final two lectures. In *The Government of Self and Others* ([2008] 2010), Foucault argues that philosophy must not be limited to discourse alone but must put itself to the test of practices. This is explored somewhat abstractly through the concept of *pārrhēsia*, or the courage of truth, but is made concrete through the example of the Cynics in *The Courage of Truth* ([2008] 2011) lectures the following year. For Foucault, the Cynics offer a rare example of living life as a test, as a form of praxis or aesthetics of existence. In the Cynic's constituting of himself as a spectacle, this is a way to confront other individuals with their own contradictions. In this way, the Cynic's self-care also becomes a care for the world. Experimentation with technologies of the self undergird the entire process of this experimental form of an aesthetics of existence, firmly foregrounding the conceptual importance of technology in the process of subjectivation, or informing the subject.

As little as Foucault wrote about technology proper outside of the larger framework of technique, he wrote even less about the concept of information. What this genealogy reveals is that an important gap exists. Foucault's philosophy offers an interesting call back to the *technē* of the Sophists, and in this way we can see how his technologies of power certainly in-form the subject. However, there is potential to connect a concept of information to this Foucauldian concept of *technē* in a way that establishes a firm ontological grounding for posthumanism. That approach to information is the primary goal of this work, and will be completed in Chapter 6, after first exploring the concept of processes of subjectivation in further detail in Chapter 5.

Conclusions

Through this genealogy, we have seen that the way each philosophic system theorizes the concepts of *technē/technology* and *form/information* is closely related to both the metaphysics and epistemology of that system. By exploring the various ways that technics and information have been understood in the history of philosophy, we are now well situated to explicate an alternative understanding of these concepts that will offer opportunities for new ways of thinking about media and technology. In this genealogy, we have seen how the work of David Hume and Michel Foucault in many ways harkens back to an understanding of *technē* that existed when philosophers and Sophists first began to distinguish themselves from one another. Drawing from this tradition, we will begin to develop a new understanding of what it means to be human.

In the next chapter, we more fully explore a Foucauldian approach to processes of subjectivation as they relate to media. We will explore an example of how big data might be used as a method of self-care as an alternative to its use for social physics within the cybernetic tradition of control. Additionally, we consider the ways that two different social networking sites, Facebook and Ello, construct different processes of subjectivation.

CHAPTER 5: Subjectivation Processes and Big Data

“What happens when one has discovered, when one knows that one has not done what one ought to have done? Is there repentance, self-punishment, and allocation of one’s own guilt? Absolutely not. [Rather,] straight away, once the mistake has been discovered, there is the formulation of a rule of conduct for the future, a rule of conduct that has to enable and henceforth to attain the aim sought. There is not even an attempt to find the causes or roots of the fault; no etiological exploration of the fault committed. There is the effort to constitute straightaway a sort of operational schema for the future. It is a question of programming one’s future conduct.” – Michel Foucault [2012] 2014, 243-244.

Thus far I have advanced three main arguments about information: (1) the current problem-space of information is centered around a resource doctrine approach that sees both information and data as a resource to be leveraged for human use and profit; (2) the traditional ethical and legal approaches of critical theory are not sufficient for handling the challenges of big data; and (3) understanding the historical inscription of *eidos* and *technē* will enable their reconfiguration in light of the contemporary problem of capitalist capture of the subject. These three arguments have primarily focused on the challenges linked to the present understanding of information in the context its historical development. Beginning with this chapter, I now move forward with the project of developing a posthuman approach to information and big data. To develop this understanding, I argue that we must understand big data in the way it specifically relates to processes of subjectivation and redefines

information within a material and embodied framework. This chapter offers a first approach to the possibilities for understanding the role big data can play in one's processes of subjectivation. First, I consider the theoretical possibilities of using big data as a form of self-care. I then discuss the results of my research on students' critical and creative interventions in their own processes of subjectivation as they relate to Facebook.

The Development of Technologies of Self

Foucault's later work offers the most promising framework from which to theorize the changes being wrought by the rise of big data. Reflecting on his own work, Foucault (1997) claims that his long-term objective has been to explore the ways that humans develop knowledge about themselves, through topics reflected in his various books that include economics, biology, psychiatry, medicine, and penology. Much of this early work focused on technologies of power, but in his later lectures at the College of France, Foucault's (1997) emphasis shifted to technologies of the self that subjects perform "in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality," (225). The development of the technology of self is traced through ancient philosophy and Christian asceticism with the common link of the concern for the care of self.

In *The Hermeneutics of the Subject* ([2001] 2005), this concern for the care of the self is traced more fully through its historical development. In particular, Foucault focuses on the way that thinking about self-care evolves over time in relation to issues of the treatment of the body (dietetics), relations to others through social duties (economics), and the erotic

(love). In many ways, this care of the self came to reflect the whole of ancient philosophic pursuit, reflected clearly in the works of Epicurus, Zeno, and Seneca, to name only a few (Foucault [1984] 1986). Contemporary culture, Foucault claims, tends to focus on Socrates' emphasis on knowing oneself, based in part off the inscription to "know thyself" above the entrance to the Oracle at Delphi. However, this represents a shift from having knowledge of self arise as the result of self-care to the modern condition of having knowledge of oneself as the primary task. This shift ultimately disregards the original context of the care of self. This emphasis on knowing as opposed to caring stems in many ways from the "Cartesian moment," which emphasizes self-evidence as a beginning point, elevating it to its own form of consciousness in which knowing one's own existence is the most basic necessity for being able to seek truth (Foucault [2001] 2005).

Foucault ([2012] 2014) is careful to point out that these forms of examining one's own consciousness can and have changed throughout history, specifically detailing the differences between the Greco-Roman and Christian practices of examination of consciousness and the different effects of knowledge and subjectivation derived from these practices. These practices might alter the nature of what one examines (what one has done, what one has to do, what one is going to do, the situation in which one finds oneself or in which one might find oneself); the instruments used in the examination (concentration, memory, virtual discourse, confession, writing); or the objective (to discover something unknown, to assure mastery of oneself, to gauge one's process, to purify oneself of faults). The Pythagoreans, for example, focused on the importance of memory and gauging one's

progress. Since Foucault's turn toward the process of subjectivation and the care of self in the late 1970s and early 1980s, big data's widespread adoption has effected significant societal changes, making it worthwhile to explore how contemporary practices of examining one's own consciousness and the care of self have been altered.

Before exploring the importance of media specificity in the next section, it is worth noting that one criticism of Foucault's shift to an emphasis on experimental processes of subjectivation that is perhaps counter posed to posthumanism is the issue of whether it falls back to a Kantian notion of moral responsibility that ultimately rests on the individual as a body that is somehow supposed to create itself through subjectivation (Behrent 2013; Braidotti 2013; Hayles 1999). Therefore, although Foucault's work on the processes of subjectivation and its relation to power/knowledge resonates well with later work on posthumanism, it ultimately lacks the ontological framework to conceive of these as embodied processes capable of escaping the morally responsible Kantian individual. It is only a feminist and Deleuzian/Simondonian reworking of ontology that creates an onto-epistem-ology that is capable of overcoming this fall back to a Kantian morally culpable individual (Barad 2003; Braidotti 2011b, 2013). Therefore, while this chapter reflects some of the problematic questions about who or what sits at the center of Foucauldian processes of subjectivation, the following chapter will elaborate an ontology that supports an assemblage theory of the nomadic self, which hangs together through the habit of saying 'I' (Deleuze and Guattari [1972] 2009).

Media Specificity in Subjectivation

Before fully exploring the role of big data in processes of subjectivation, I would like to first highlight the importance of media specificity for such work. Beyond Foucault's more philosophical definition of technology as it relates to power and self, later Foucauldian work has foregrounded the importance of media specificity for understanding the processes of subjectivation. Jeremy Packer (2012), for example, claims a central position for media because of the role that they play in the construction of knowledge, but also the role that media might play through Foucault's later work on power and subjectivation. Further, much work remains to be done in developing this link: "the project of making sense of how media have altered the production of knowledge that organizes how the world is known, processed, and acted upon has barely begun," (10). I will briefly consider some of the work that has been done and its potential for future development.

A first major consideration is the primary importance of visual technologies in processes of subjectivation. For Rosi Braidotti (2011b), the omnipotence of visual media forms an all-encompassing technique of control that structures self-styling, self-mastery, and self-care. Daston and Galison (2007) show how such an emphasis on visual instruments in scientific practices not only prevents neutrality in science but also creates a normative standard for scientific subjects. Bratich (2006) interprets reality television as a way to reconfigure subjectivity to more closely align with control society. Packer and Reeves (2013) show how optical media have been leveraged to define surveillance norms for military use that provide the baseline against which enemy detection occurs, opening the door for

autonomous detection that no longer requires humans. In each of these works, visual technology is foregrounded as a catalyst for changes in subjectivation.

Yet, the importance of media extends beyond its connection to visual instruments. Kittler ([1985] 1990) takes this process one step further. Foucault's approach embraced a presupposition of externality that avoids the hermeneutic approach and instead studies the fact that something has been said. Kittler embraces this approach but adds a presupposition of mediality, in which the concept of media is expanded greatly and every historical epoch is determined by its own technological possibilities. In this way, the question of technology becomes central, subsuming, among other fields, literary studies. A third presupposition for Kittler is that of corporeality, which insists on the importance of the body as a place for inscription by media. This aligns well with the program of posthumanism, in which the importance of materiality and specific bodies is elevated.

Perhaps more important is the role that technology still must play. Of course, perspectives diverge widely here. On the one hand, as Giorgio Agamben (2009) argues, all of life has been encompassed in some form of an apparatus, and rather than producing a subjectivity, contemporary apparatuses instead function through a process of *desubjectification*. Cell phone users, for example, are captured within an apparatus that removes subjectivity in place of a number through which a person can be controlled. From this perspective, the key route forward would be attempting to find ways to intervene within a particular apparatus, such as that of the cell phone, in order to be able to once again direct one's own processes of subjectivation. And yet, the very possibility of actually being able to

do this is also in dispute. Deleuze and Guattari ([1972] 2009) see a potential usefulness in such decoding and deterritorialization. As I will explore in further detail in Chapter 7, the asignifying semiotics, while linked to capitalist axiomatics, can be used to act directly on the real and create new processes of subjectivation that nonetheless exist outside of capitalist regimes (Lazzarato 2014). In contrast, others such as Bifo Berardi (2011b; 2015) argue that extreme deterritorialization is leading to an exhaustion of the body, fueling a desire for recomposing subjects via embodied events such as street protests.

On the other hand, Rosi Braidotti (2013) takes a more affirmative approach to technology. If we accept that posthumanism has shifted the question from “what are we?” to “what do we want to become?” then, Braidotti argues, the next question is “how can technoculture help us achieve this?” In other words, how can we be more active in these technologically driven processes of evolution? Technology is central to this because at both the macro and micro levels the body is part of a network of power affects that are induced by technology.

One fundamental change is the shift in instruments, or the medium of self-reflection – the shift from reflective writing to automated and/or semi-automated data collection. The media specificity of our mode of self-reflection is worthy of reflection in its own right. Foucault (1997) claims that a new form of the care of self creates a new experience of self, tracing this shift from the medium of orality and Socrates’ emphasis on the dialogue in early ancient Greece to the entrenchment of writing by the Hellenistic age. This transition to writing allowed the process of self-reflection to intensify and deepen, creating a new field of

experience that was not present through orality alone⁴. Of course, Foucault does not explicitly interpret this shift from orality to writing as a change of media, yet this distinction seems worthwhile. Nietzsche, commenting on his switch from using a pen to a new Malling-Hansen Writing Ball typewriter, wrote that “our writing instruments contribute to our thoughts.”⁵ Similarly, we might hypothesize that one’s experience of oneself through a specific medium, and the subsequent self-reflection specific to that medium, also impacts one’s form of self-care. Foucault hints at this disruption when he says that the copybook, introduced during Plato’s time, was a new technology that “was as disrupting as the modern computer into private life today” (Foucault 1997). Changes from writing to print featured similar profound disruptions (Eisenstein 2009).

With the shift to writing, a greater emphasis is placed on one’s day-to-day activities, and self-care becomes linked to the process of writing, which could take the form of notes on oneself, treatises, letters to friends, and keeping notebooks (Foucault 1997). Rosi Braidotti (2014), a former student of Foucault’s, also emphasizes the importance of diary writing as a strategic way to position oneself in the world and as a crucial component in the activity of critical theory. Writing remains important, and has expanded to include emails, tweets, and more. However, one is now also able to reflect through quantitative approaches that are more

⁴ Yet, this use of language also leads to an overcoding of our lived experience in terms of a hierarchical, exclusive, biunivocal symbolic order. This overcoding, as I will argue in Chapter 7, is one of the major reasons that the human has been elevated as a necessary mediator of language, which takes priority over all other strata. Guattarian mixed semiotics will demonstrate the problem with this structuralist approach.

⁵ Kittler (1990) translates this quote from a typed letter from Friedrich Nietzsche to Peter Gast, dated 1882, found in *Briefwechsel*, ed. Elisabeth Förster-Nietzsche and Peter Gast (Berlin-Leipzig 1902-09), IV, 97.

widely available than ever. Further, both the qualitative and quantitative forms of reflection are linked to data collection and data analytics and subjected to algorithmic operations. This data might reflect information about one's physical location, number of steps taken, nutrition, mood, or even sleep patterns. Subjects are then able to use this data as a form of self-care by looking for patterns in the data. One might, for instance, search for recurring incidents that are associated with poor sleep patterns, asking if they slept better when they walked over 10,000 steps in a day or when their last meal occurred more than two hours before going to sleep. This type of tracking opens up a new way to facilitate self-care while simultaneously feeding into the biopolitical data collection of the control society.

Some of this data is automatically collected without the subject even being aware of its collection in the form of cell phone location tracking or license plate scanning. Often, one will voluntarily opt into this automatic collection as with smartphone life logging apps, the Fitbit, or Apple's Healthkit. Other data such as daily food consumption is being manually entered into applications and spreadsheets that quantitatively track and then display the information. Meanwhile, the purchases of this food is also being tracked by grocery stores, reward cards programs and credit card companies. Often, though, these forms of collection overlap in the creation of messy big data. Those involved in the Quantified Self movement voluntarily track information about their own bodies and lives (small data), but willingly contribute it to larger databases/archives (big data). Even seemingly small data collection efforts thus add to big data collections and the predictive analytics and data mining to which

it contributes. How does this shift from intentional qualitative reflection to the addition of automated quantitative reflection affect subjectivation and the care of self?⁶

Know Thy Data: Truth-Telling, Broadened Experience, and Norm Creation

To better understand the effects that this shift to quantitative reflection has on subjectivation and self-care, we can first look toward Foucault's analysis of other shifts in self-care. Sebastian Harrer (2005), links the philosophical and religious model of spiritual guidance in Foucault's later work to the model of surveillance in his earlier works. Each of these can occur in a manner that is either direct – the supervisor or spiritual master is in direct contact – or indirect – the unknown presence of the supervisor in the Panopticon, or regular reports written for an imaginary addressee. These indirect methods, Harrer argues, both lead to subjects disciplining themselves, through the imagined gaze of either the supervisor or the spiritual master. Epictetus went so far as to encourage his students to live as if he were constantly watching them. Automated data collection blurs this distinction between a spiritual master and a form of surveillance. Data being collected by PRISM, for example, clearly falls into the framework for surveillance; however, those who choose to self-track seem to be

⁶ There also remains an important question about the place of affect/attention as it relates to subjectivation. For example, our attention is captured by devices such as cell phones and laptops that then quantify our activity regardless of the content on such devices. Some forms of self-care increasingly insist on the importance of carving out a space in which does not use such devices for a period throughout each day. This might take the shape of avoiding cell phone use during dinner. These are important and significant questions that are unfortunately beyond the scope of the current project.

seeking something more akin to a machinic spiritual master. From either perspective, though, this automated data collection makes a fourth pivot in which one's activities are *actually* being constantly "watched," – but they are being watched by machines rather than other humans. This shift also echoes many of the changes from a discipline to a control society (Deleuze [1990] 1995). Machine watching occurs whether or not someone voluntarily opts into any forms of data collection. To take only one example, the information that Foucault ([2004] 2008) included as part of his analysis of biopolitics – information on health, hygiene, birthrate, life expectancy, and race – is automatically captured and stored. This watching in the form of machines, whether as a spiritual guide in the form of the quantified-self movement or as a form of surveillance in control society, plays a significant role in the process of subjectivation, which ultimately changes the type of self-care that occurs. Further, quantified-self data is more frequently *also* part of the surveillance society as self-trackers purchase and use widely produced commercial devices that automatically share data with the companies who create the devices.

The process of subjectivation is driven by the "relationships of power" or "field of forces" within which a subject exists and constitutes itself: "individuals are being interpreted and interpret themselves, not in the sense of discovering their innermost essence, but in the sense of being submitted to relationships of force or voluntarily applying them to themselves," (Harrer 2005, 82). The ways in which one intersects with big data, whether voluntarily or not, affects one's subjectivation. The process of datafication thus shifts our methods of self-care just as the transition from orality to writing affected the forms of self-

care. The important question to address, therefore, will be the specific ways in which datafication alters the process of subjectivation and self-care.

This process becomes increasingly automated as it captures even more of the actions of daily life. Reflecting on oneself through data serves to further emphasize the effects of the coupling of truth-telling with the self, as a subject is more clearly than ever seen as an object of knowledge. A proper starting point then would be exploring the point that Foucault ([2012] 2014) signifies as the starting point of the development of Western man's development of subjectivity: the linking of the verbalization of sin and an understanding of oneself. The emphasis on the process of continual improvement that arises through the linkage of Christian penance, baptism, and asceticism ultimately breaks down the notion of any "true" nature for a subject. Instead, in the process of transforming from one who has sinned into one who is no longer a sinner, the truth of the subject is manifested – is created through these processes of penance, baptism, and asceticism:

What is important, and I think decisive... is this coupling of "truth-telling about oneself" whose function is to erase the evil and "transit of self" from the unknown to the known, giving oneself to oneself and in one's own eyes a status of object to be known at the same time as one verbalizes the sins in order to erase them, getting oneself to exist as object of knowledge at the moment that, through verbalization, one provides oneself with the means to bring it about that the sin no longer exists or at any rate is erased, is forgivable. (Foucault [2012] 2014, 225)

Further, rather than having to confess verbally, one's "sins" are put on display through their presence in the data: How many days did you achieve 10,000 steps this week? How many calories were consumed over the weekend? How well did you sleep? Did you drive less to help reduce your carbon footprint? These results are laid bare, most often uploaded to a corporate server, and frequently shared through social media. These "sins" – our lack of exercise, poor diet, trouble sleeping – are constantly monitored and shared in a form of continual in-the-moment confessions: I'm not walking *right now*. Many devices such as the Fitbit, which tracks the number of steps one takes throughout the day, will even vibrate to remind us if we haven't moved enough recently because we are, for example, engrossed in writing an essay about the effects of datafication on subjectivation and self-care.

If Foucault can describe writing as intensifying and widening the experience of the self, one struggles to find the words to express the changes wrought by contemporary data collection. Marcus Aurelius' letters are described as containing "meticulous concern with the details of daily life" because they contain a one-page general overview of the day's events, including sentence long descriptions of meals that were eaten (Foucault 1997). What then, do we say of the data visualizations which show a 30 day food and activity log that features average food intake in calories, average activity in calories, average net calories, basal metabolic rate, macros broken down into average protein, fat, and carbs, average calorie consumption by day of the week broken into takeout, drink, sweets, oil & condiments, grains, fruits, vegetables, dairy, nuts & legumes, and meat, and, finally, total calories consumed of

each food particular food?⁷ Certainly there is a further intensification and widening of the experience of the self. An increase in intensity stems from the ability to easily track consumption at a much deeper level; rather than simply considering what and when we eat, the very foods we eat can be broken down into further complex categories such as calories and macronutrients. Yet, this also widens our experience because we can now conceive of foods – and our relationship to them – in entirely new ways. We’re now consuming calories and protein rather than just chicken, for example. And this protein can be characterized further as organic or nonorganic, local or nonlocal, humane or factory farmed, etc. This is a much wider avenue of correlations through which we can experience not only ourselves, but also our relationships with the world around us as we change the way we think about our health, our personal relationships, and our work through data that is collected about these processes.

More extensively, even if one is not actively tracking information about one’s self, the correlations derived from the massive amounts of data are creating normalizations that powerfully affect our process of subjectivation. Foucault ([1975] 1995) demonstrated the power of normalization as it relates to the innovations of disciplinary writing:

Thanks to the whole apparatus of writing that accompanied it, the examination opened up two correlative possibilities: firstly, the constitution of the individual as a describable, analysable object, not in order to reduce him to ‘specific’ features, as did the naturalists in relation to living beings, but in order to maintain him in his

⁷ See, for example: <https://studentshow.ccnsite.com/gallery/24170765/Quantified-self-A-data-visualisation>

individual features, in his particular evolution, in his own aptitudes or abilities, under the gaze of a permanent corpus of knowledge; and, secondly, the constitution of a comparative system that made possible the measurement of overall phenomena, the description of groups, the characterization of collective facts, the calculation of the gaps between individuals, their distribution in a given ‘population’. (190)

The correlations drawn from secondary uses of big data push this process of normalization to its extremes, allowing the collection and compilation of an even more detailed corpus of knowledge. The ability to measure, describe, and calculate has grown more precise and drives a strong image of “normal” against which to judge and examine oneself—customers who bought Michel Foucault’s *Discipline and Punish* also bought Simone de Beauvoir’s *The Second Sex*; customers who bought unscented lotion and then magnesium supplements are likely pregnant; a higher credit score correlates to a higher income; etc. (Mayer-Schönberger and Cukier 2013). One can compare his or her own preferences and habits to the norms nearly infinitely and in detail both broadly and narrowly. The Neighborhood Scout website, for instance, allows one to view data on any neighborhood for categories such as ages, marital status, gender ratio, military and college status, household type, average income, education, unemployment, top industries, average commute time, migration and mobility, ancestry, and spoken language. This reflects the ability to look at not only large aggregate normalizations, but normalizations at a much finer scale, down to the neighborhood level in this example. This normalization is only one database link away from being able to display the average number of calories eaten or steps taken by one’s neighborhood. This ability to

view oneself in the normalized context of the rest of the world, or one's country, state, city, or even neighborhood, affects the way one understands and reflects about oneself.

While the instrument of this process is a new form of datafied reflection, the objective reflects earlier practices of gauging one's progress to purify one's faults. These faults, though, are based on self-selected aims rather than through any moral law (Foucault [2012] 2014). While one is free to set any aim at all, the field of forces enacted by one's relations to the correlative normalizations of big data ultimately have some bearing on the selection of an aim. In other words, these aims are coded by the technical apparatuses of data collection. We can self-observe so long as we do it in terms of the categories created by dominant social codes. Historically a spiritual master would help direct one's actions toward this goal based on the results of self-care: "tell me what you are so that I can tell you what you should do," (Foucault [2012] 2014, 235). With big data, the spiritual master becomes irrelevant. The data can both tell you what you are and, through an algorithm, suggest to you what you should do – you're overweight and you can correct this through a daily 200 calorie deficit with a reduction in carb intake supplemented with additional protein; try these suggested recipes! Self-care becomes constant, but, in many ways, requires less effort. Rather than long reflections before bedtime, one's device can notify him or her of the sin as it is happening, even recommending a solution such as getting up and walking or having a glass of water.

These correlative normalizations from big data do not reflect a moral code, but rather suggest aims with which we might choose to freely align ourselves, much like one historically might choose to freely align oneself to the will of a master. Our data

automatically confesses these sins, and rather than fretting over them, working to understand them, or exploring the fault, it's easy enough to simply develop a new set of rules for the future: "it is a question of programming one's future conduct," (Foucault [2012] 2014, 244). One can now quite literally program one's future conduct, not just through a schema or set of rules, but through algorithms that can make suggestions and formulate new rules to help one stay on track.

Data as Self-Care

The form of self-care that is afforded through the quantitative reflection of big data appears to be a blending, or folding back of the Christian practices on the Greco-Roman practices of self-care. The Christian apparatus of "the principle of obedience without an end, the principle of incessant examination, and the principle of exhaustive confession" (Foucault [2012] 2014, 289) is still present, though in ways modified by datafication. However, these practices completely lack the Christian emphasis on the importance of the origin of thoughts. In a world in which big data highlights correlation, causation loses much of its importance.

While I have traced out the ways that the utilization of big data can more prominently than ever help program one's future conduct, this conduct has become untethered from its link with Christian moral obligations. Capitalism decodes the objective determinate representations such as Christian morals and reterritorializes them as infinite subjective representations such as individual and familial imaginary/symbolic representations (Deleuze

and Guattari [1972] 2009, 303). However, this untethering opens up a potential line of flight. Currently, big data does present a powerful norming function, especially as it is applied in industries such as insurance and marketing. Without a tethered moral obligation, though, there is an opportunity step outside of these norms and set one's own objective, using the datafied version of the Christian apparatus to help achieve this objective. This harkens back to the Greco-Roman "mode of subjectivation involving a construction of self, a shaping of its existence, the continuous application of a care of self as a practice of freedom" (Gros 2011, 353). This is a conscious acceptance of an aesthetic mode of living, for the "beauty or glory of existence" (Foucault 1997, 266).

Practices of those within the quantified self movement demonstrate how such an interplay of self-care and subjectivation might work. The subject who self-tracks decides what objective they will pursue.⁸ Current practices focus on objectives such as health or mood, but future objectives need not be limited to these. The objective of one's life, achieved through practices of self-tracking, is limited only by the possibilities of the imagination (as they are shaped by current symbolic codes). Although the confession and obedience can be automated, the ultimate objective is left to self-reflection and the freedom of one's own choice. As Gros notes, this ability to shape oneself also hints at Foucault's Cynic gesture in his last few lectures, as it offers the opportunity to craft one's life in a way that is confrontational to current norms:

⁸ Of note, this selection of an objective always must occur within a particular historically situated discourse network that plays an important role in coding the range of possible objectives.

... the Cynics represent in fact the moment at which the value of asceticism consists in its being addressed as a provocation to others, since it involves constituting oneself as a spectacle which confronts each individual with his own contradictions, so that the care of self becomes precisely a care of the world, the “true life” calling for the advent of an “other world.” (Gros 2011, 355).

The Cynics live their lives as a spectacle addressed to others, pointing to the contradictions and absurdities of life. It is life as testimony to truth-telling, constantly asking what can the form of life be that practices truth-telling (Foucault [2008] 2011). This potential return to asceticism leaves one with a pressing question: how might I construct myself, with the assistance of self-tracking and/or big data, to create a spectacle that helps others confront their own contradictions?

Such an approach can avoid the problems of the straightforward power/knowledge analysis performed by Andrejevic. Despite the power gap created by corporate and political access to big data infrastructure, many sources of big data are either actually or potentially available to individuals. Corporations often use the social networking sites Twitter and Facebook as a source of big data that can be used for projects such as sentiment analysis. Moderate programming skills and a small investment in Amazon Web Hosting services can enable this sentiment analysis to be completed by any individual. In theory, these skills and services are open to anyone willing to take the time to learn to do such analysis. Endeavors such as citizen science projects also open up the possibility of both creating and analyzing data sets to individuals. The baby tooth experiment from the 1950s and 1960s saw citizens

collect over 320,000 baby teeth to so that they could be analyzed in relation to the impact of nuclear testing on the presence of radiation in the teeth (Kennedy 2016). Projects such as these can rely on participants from around the world to collect, submit and/or analyze data, and can often generate extremely large datasets.

Even without the level of access that large corporations have, an individual can access and utilize big data to shape his or her own life toward a self-selected goal. This activity, this shaping of one's own life, is a form of provocation that takes place outside of signifying semiotics. Such an active shaping of one's life offers a way to move beyond an *exclusive* focus on the dimension of discourse to an opening up of a new potential for intervening in power and creating new avenues for programming one's future conduct. In short, a Cynic approach that embraces truth-telling as a form of life makes the argument that one's own self-care offers the best approach to taking care of others through the provocations that it offers. In the case of data, such an approach is less about being politically active in debates and issues that surround specific political and policy questions about who can collect data about whom or the possibilities of existing without being a data object, and rather more about structuring one's own life and processes of subjectivation to reflect the larger contradictions that exist in current data practices. It is living one's life as a work of art upon which others can look and reflect. It is only after being confronted with such contradictions that the conditions for change might arise.

While in some ways this may seem extreme, it may be easier to understand in context of a Deleuzian approach to becoming-other. Although Gros does not himself frame it in such Deleuzian terms, he makes clear the importance of the other in Foucault's work:

The philosopher thus becomes someone who, through the courage of his truth-telling, makes the lighting flash of an otherness vibrate through his life and his speech.

Foucault can thus write these words, which he will not have time to utter, but which are the last he wrote on the last page of the manuscript of his final lecture: *'What I would like to stress in conclusion is this: there is no establishment of the truth without an essential position of otherness; the truth is never the same; there can be truth only in the form of the other world and other life (l'autre monde et de la vie autre).'*'"

(2011, 356).

Here we see some resonance with Deleuze's becoming-other. This becoming, for Foucault, is important not only for one's own self-care, but also in caring for others. This becoming other can impact others and help create the space for imagining the other-world that remains to be created in the future.

Critical Interventions via Facebook

Shifting away from the broader theoretical analysis of big data as a form of self-care, I now explore more concretely how different social networking sites can activate processes of subjectivity in different ways. This analysis makes clear the media specificity of subjectivation, but also shows how technological design can be utilized to impact the range

of subjectivation that is possible. While the last section focused on the relatively broad theoretical implications of intervening in one's own processes of subjectivation through data practices, this section develops a practical empirical example using Facebook. In this example, I worked with students to develop an understanding of what processes of subjectivation are, reflect on how these processes are linked with and through their use of Facebook, and then asked them to critically and creatively intervene in the processes as a way to better understand the practical implications and possible potentials and limitations of such interventions.

Working with a group of 36 students who completed a series of assignments related to their understanding of Facebook's use of their data, I completed a qualitative analysis of their work that addressed two primary research questions:

1. How can one participate actively in one's own processes of subjectivation related to their Facebook data?
2. What factors facilitate or limit this ability?

Much of the contemporary research on social media attempts to analyze current practices related to its use (boyd 2014; Turckle 2011). My project differs in that it asks students to actively raise their own awareness about their use of Facebook and Facebook's use of their data while also critically and creatively intervening in that process. This study does not in any way attempt to definitively identify or explicate the full spectrum of possibilities related to Facebook and processes of subjectivation, but is instead an attempt to provide an experimental framework for participants to begin to understand and intervene in their own

usage of the site. This study embraces pedagogical action research because I am experimenting with ways of intervening in my students' relations to technology as a pedagogy of social action and action research (Barge et al. 2008; Reason and Bradbury 2013).

The project was broken up into a series of weekly reflections mixed with in-classroom activities. During the first week, students viewed their own Facebook News Feed while reflecting on how often they use Facebook, where the content on the News Feed originates, and how often they think about the source of the content that populates their News Feed page. For the second week, students worked in small groups to view and reflect on the ads that were presented during their use of Facebook. Specifically, they were asked to hypothesize what information Facebook ads were drawing upon for the targeting of ads and where that information originated. After this reflection, we worked together as a class to create an ad using Facebook's advertising platform, which offered an opportunity to experience the vast range of data categories outside of Facebook's own platform that can be used to target ads. For example, students could see how Facebook draws on databases that would enable targeting based on the number of credit lines a user has open. In this way, I sought to intervene in the students' processes of subjectivation by developing a deeper understanding of the ways in which they have been targeted for ads by other advertisers. Knowing more about why certain ads might appear to them can broaden the potential approaches that are used to intervene in these processes. After collectively creating this ad,

students reflected on how they believe Facebook ads impact them and whether and how often they click on ads.

The next part of the project required students to download their Facebook ads topic list. Ads topics are based on Facebook Likes, but they allow for a much broader targeting of interests not limited to specific Pages (Constine 2011). The information that is available for download shows both the ads topics associated with a user as well as a list of recently clicked ads. While reviewing their own ads topics in class, students reflected on the following questions:

What is your reaction to seeing these topics? Do you recognize them? Are they the types of things you would expect for you?

Based on this data, how do you think Facebook understands you, or, in other words, how is Facebook constructing you as a subject?

What does Facebook seem *not* to know about you?

What do these data make you think about yourself and your use of Facebook?

Considering this series of weekly reflections, students were then asked to critically and creatively intervene in their processes of subjectivation related to Facebook through an artistic project in conjunction with an artist's statement that explains the intervention.

Through this process I am both asking the students to intervene in their own subjectivation, but also to use the artist's statement to reflect on the relative success or failure that they had in doing so. What are the potentials and limitations for this approach to intervening in one's data, within this Facebook-centric activity?

After completion of the projects, I analyzed both the projects and students' reflections on the questions from the previous weeks. Based on this analysis, three major themes emerged from student responses:

1. The for-profit design of Facebook impacts our processes of subjectivation
2. It is hard to re-shape the data-based "first impressions" created by one's initial use of Facebook
3. Awareness of Facebook's functionality can impact how we use the service.

Before expanding on each of these in more detail, it is worthwhile to note that many students reported finding targeted ads both creepy and likely to contain viruses, thus they rarely intentionally clicked on the ads and for that reason did not believe that the ads affected them. One student wrote: "I feel creeped out that they know so much information about me and partner with other companies to expand their knowledge even more." Another reflected: "I usually don't click on ads because I thought they were virus related." Of course, Facebook marketers are widely aware that clickthrough rates vary from 0.02-3.2% depending on the type of advertisement used ("The Facebook Ads Benchmark Report," 2013). In other words, ads campaigns are considered successful even if consumers are "rarely" clicking ads. However, perhaps more importantly, recent work has demonstrated that the presence of such targeted ads make an impact whether or not the viewer actually clicks them. When a consumer knows an ad has been targeted toward them, they will then make an adjustment in their self-perception based on the implied social label of the ad, so long as the targeting

seems to be accurate (Summers et al. 2016). In terms of processes of subjectivation, then, the viewing of the ad may be as important as clicking on it.

The first major theme to arise from my analysis is that the for-profit design of Facebook plays an extremely consequential role in how the site is constructed and which items appear in the News Feed of each user, which in turn has an impact on the processes of subjectivation. One student project highlighted the relationship between the ads topics and subjectivation, claiming that, “This intervention of sorts shows that we are distinct from these inputs (ads topics), but they also shape who we as individuals are.” This was highlighted through their artistic project that showed an individual — “i,” — which was ultimately carved out of the space inhabited by their ads topics (*Figure 3*). Another student was surprised to realize they were being influenced by data driven targeting: “I think their ads impact me because if I was already considering doing something, like buying concert tickets, & an ad for those tickets came up I would have thought it was a *coincidence & fate* I should buy them. (until now),” (emphasis added). This response offers a concrete example of the way that targeted advertising was subjectivating this student as a consumer in a way that was outside their previous realm of comprehension. Indeed, many students, in looking over the list of clicked ads that were included with their list of ads topics did not realize that they had been clicking on ads: “There were some ads that I did not remember clicking on, though my larger observation was that so many of the ads on which I clicked were ads that I apparently didn’t understand were advertisements at all.” Based on class discussions, it seems most likely that these ads were stories inserted into the News Feed that are only identifiable by a

small gray “Sponsored” label, but otherwise entirely resemble a story shared by a friend. In this way, the ads designed to generate a profit for Facebook are shaping its users’ interactions and processes of subjectivation beyond their ability to recognize it as doing such.

Sid (band), Appalachian State University, Rodrigo Santoro, Woody, Kenny McCormick, Apple crisp, Johnny Knoxville, Indiana Jones and the Last Crusade, npr music, Winston-Salem North Carolina, Mast General Store, List of United States cities by population, Lowes Foods, Homer Simpson, Taken, Sexual attraction, Slice (Five for Fighting album), UKF Dubstep, True Activist, Bananas in Pyjamas, James Bond, The Beatles discography, Call of Duty 5: World at War, Reggae fusion, Bastiat Institute, Live+ Sum 41, Dr. House, Congressman Thomas Massie, Xbox 360 system top box, Stewie Griffin, Epic film, Gentleman (musician), WebKit, Political economy, Breakbeat, Kansas (band), The Beatles at the /l, Business and industry, Indiana Jones and the Temple of Doom, H eet, Rick and Morty, The News & Observer, Lettuce, Liberal Party (UK), Mash, Masala film, dave matthews band, Lena Headey, Little Miss Sunshine, Fictional film, coca cola company, Switchfoot, Sub Focus, BARE, Shots! Shots! Shots! Shots! Shots!, Phil Collins, James Shields (baseball), FiveThirtyEight, NC State Wolfpack, Cat's Cradle, Dopapod, Classical liberalism, Adventure fiction, Thomas Massie, Pigeons Playing Ping Pong, Welcome (2007 film), Lost Ark, Lego Indiana Jones, Godrej aer, Skill, The Beatles' roof, James Bond in film, Rhythm game, Switchfoot discography, Summer festival, Indiana Jones (franchise), Food and drink, Emerg for Cutie, Doctor P, Matt Kibbe, event, Personal digital assistant, M om, Argument, Paul McCartney's Unplugged Tour 1991, Sid, Progre s, Indiana Jones and the Dance of the Giants, Summer Live '09, Debr Movie, Rob Thomas (musician), Indiana Jones and the Seven Veils, (album), Mr. Bean, Artifex, Kid , Hobbies and activities, Lettuce o Starr, Frank Reynolds (It's Always Sunny in Philadelphia), H ie console, Aberdeen Washington, Student council, Foo Fighters disc ock, Serengetee, jack Johnson, indiana jones, Indiana Jones and th phi, Indiana Jones and the Kingdom of the Crystal Skull, Jam apanese band), Creedence Clearwater Revival, List of songs o Fighters, Discography, 300 (film), MOJOJOJO, Political cultu eFingers, Abercrombie North Dakota, Switchfoot: Live – EP, W re for Fighting, Funk rock, Gary Johnson, Z (Aion album), 2-step g ound, Essay, Harrison Ford, Bishop Nehru, Nirvana discograph ucts, Shay Carl, Infiniti Emerg-e, Zack Snyder, Indiana Jones and th tis, 300, Soft rock, Vitis, Safari (web browser), Obsessive–compul Vibram, British rock, Taquería, Regular Show, Sports and outdoor . Test (assessment), Frédéric Bastiat, George Harrison, Lotus, D , Cookout, Evan Longoria, Ideology, Wasting Light, The Beatles: Rock Band, Gas mask, Hong Kong English pop, Social philosophy, Stephen Hillenburg, Kenny, יילג קוליה-קוקיה

Figure 3. i

A second major part of this first theme is that the for-profit nature of Facebook is responsible for an increased emphasis on shallow entertainment, and students in turn believed that this increases their own shallowness. One student explained their newly discovered understanding of this process:

What is emphasized and continually shown back to me in my ads is the shallowest part of what I value in my life and Facebook condones this, simply because they are getting profit from it. My personal, and often what I think of as private, information is being taken and sold to many third-party organizations who in turn gain power and money from knowing all this information.

This perspective was also reflected in a student's critical intervention, which imagined what their obituary would look like if it were to be constructed using the information that Facebook has found most important about them (*Figure 4*).

A related theme emerged as part of our class discussion as well. As they developed a better understanding of how the News Feed algorithm works, students learned that Facebook is increasingly focusing on video, which has increased ad revenue and engagement rates for branded videos ("Facebook Video Statistics Everyone Needs to Know" 2016). This increasing focus on videos means Facebook users are now increasingly likely to see professionally created videos by brands than they are personal and text-based updates from their friends in what might be understood as the becoming-TV of social media. For students, this change reflects the shallowness that students feel through their use of the service, and they are now able to see how this shift is driven by engagement rates aimed at profit.

Significantly, this theme also concretely demonstrates the importance of Braidotti's (2013) ethical emphasis on non-profit arrangements of intensities to escape capitalist capture of the subject. This is a point to which I will return later, but an important takeaway for the students was that the for-profit nature of the site artificially limited the ways in which they engaged with the site, thus narrowing their own actual and potential processes of subjectivation as well.

Obituary

“Our community has truly lost a great person who was passionate about Iron Maiden: Flight 666, Thank a Police officer, No Strings Attached (film), Cam Fowler, Carey Price, 7 Seconds Entertainment, Malcolm in the Middle, Sense, Keebler Company, Dough, List of Google Doodles in 2011, 2006 Tour de France, Hartford Whalers, Danny Elfman, and Internet slang.”

Figure 4. Facebook Obituary

The second major theme that emerged from my analysis of student work was that it was difficult to re-shape Facebook's “first impression” of the users that was created when they began using the service. Though students struggled with finding the language to express their concerns, it was clear that this served as important anchor in their realization that there are limitations to the ways Facebook plays a role in their processes of subjectivation. After

seeing the myriad of ways in which advertisers could target them earlier in the project, many students began to think that Facebook truly knew and understood them because it could know everything about them. However, in seeing how many of the ads topics were related to their early use of Facebook, many students began to question both how much Facebook knows and how well it can use the data it collects. From a theoretical standpoint, we might say that students began to realize that Facebook saw them more as Deleuzian ([1990] 1995) *dividuals*, only needing to know small slices of things about them to serve up narrowly targeted ads. This is an important shift in understanding because it creates a space in which students are able to see themselves as having room to intervene in the processes of subjectivation associated with Facebook.

In practice, students saw that rather than evolving over time to highlight changing interests and habits, all of the data collected by Facebook over the course of many years seems to stick with users and continue to impact the advertising process. A student explained the problem in this way: “Facebook seems to have a good idea of ‘me’ from 2009-2012, as that is when I was using Facebook much more frequently. Now I am on Facebook much less frequently, and find myself ‘liking’ far fewer pages.” Those early likes, which for this student occurred while in middle school, have stuck with her account and continued to shape the advertisements she is receiving well into college. This use of data over a long time can also potentially explain why student opinions diverged on how much Facebook seems to know about them. Students who liked many Pages early in their early days of Facebook use but who no longer use Facebook in that manner were more likely to find that Facebook ads

topics did not seem to “know” their current selves. On the other hand, for students who still actively engage with liking Facebook Pages, the ads topics have done a somewhat better job of “growing” with the students. The takeaway from this distinction is that the way one uses Facebook alters their subjectivation by the site. The limitation is that this is difficult to realize from one’s own limited perspective. It is easy to assume that others are using and being subjectivated by Facebook in ways that are similar to our own uses and subjectivations without realizing that other uses are possible and occurring. Hearing others discuss their Facebook data in class opened up students’ understanding of the diversity of uses available.

Despite several students feeling that Facebook’s ad topics were still hung up on their time in middle school, the majority of students were taken aback and how well Facebook seemed to know them:

Looking at the data it seems that Facebook knows more about me than I am comfortable with. The question of ‘What does Facebook seem not to know about’ leaves me seemingly without an answer. I say this because it seems to have information on my whereabouts, shopping tendencies and general interest. The scariest part is that the data is/was being recorded without my knowledge or consent... There should be a disclaimer to let the user know that information about them is being recorded by using the app.

In addition to highlighting the degree to which this student believes Facebook understands them, it also points to the ineffectiveness of notice and consent discussed in Chapter 3. Facebook specifically acquires consent during the creation of an account: “By clicking

Create Account, you agree to our Terms and that you have read our Data Policy, including our Cookie Use,” (Facebook.com 2017). Of course, most users do not read the Terms before they create their account and never take time to consider what data is being collected or how it is being used.

The final major theme to arise from my analysis was that many students felt empowered to make changes to the way that they use Facebook after developing a better understanding of how the site uses their data. In the artistic interventions, students struggled with how portray their own processes of subjectivation, and were even more unsure about how to artistically represent their interventions. Despite these struggles, students nonetheless felt more empowered in their use Facebook, so it is worth exploring these projects in further detail to see the new subjectivations that are created. Many students presented themselves creatively in the limited way that they now believed Facebook understood them.

One student imagined a birthday party that her father set up for her based solely on her Facebook ads topics. When they showed up, they were greeted with a zebra-print décor and performances by Ryan Sheckler and The Rifles. This was all highlighted by flash mob professional wrestler attacks throughout the party. Carbonated water and Arizona iced tea were the only beverages served. Further, she received an Aéropostale gift card, which was disappointing because she had not shopped there since middle school. Another student crafted a Tinder dating profile that was based on the way Facebook subjectivated him:

I am very interested in cats even though I don't own one, so if you have a dog but are not constantly thinking about cats I don't really see this working out. I love to look

back at old groups that I use to be a part of and also love to be constantly reminded about them... One last thing that I think you should know about me is that I never feel nostalgic about anything and feel that the current form of anything is always the best it ever has been.

A third student created a video that portrayed her as if she were featured on an episode of MTV Cribs. The video emphasized an obsession with Stride gum, peas, and the song “Monster” by Lada Gaga. However, at the end of the video, the student reveals that she feels blasé about peas, hates stride gum, and had never heard “Monster” before, deriding the inaccuracy of her Facebook ads topics. Finally, one student invented an entirely new version of themselves based on their ads topics and filmed a “Day-in-the-Life” vlog that featured this person. It highlighted the tensions surrounding an extremely conservative vegan whose favorite food is free-range celery. The argument about subjectivation rising out of these projects focuses on the limited ability of Facebook to subjectivate the students in narrowly capitalistic terms.



Figure 5. A Conservative Vegan

Another series of projects could easily imagine visualizing their surroundings with the types of things that filled their ads topics. This was particularly true when the topics seemed to only include movies, music, and a few snack items, as below:



Figure 6. A Media Rich Environment

One student went so far as to add physical copies of relevant material in their room, and used the Processing language to create a layer of augmented reality. This augmented reality allowed the user to explore the room using a spotlight and when they stumbled upon one of the ad topic associated items, the code would generate some type of interaction. Examples include a picture of Karl Marx that begins playing the Soviet Union national anthem, and a song by the Beach Boys linked to the verbalization of the word “safari.” These could only be turned off by vocally telling the computer to “shut up.” Finally, one could find the student himself laying on the ground, with a copy of *The Communist Manifesto* resting over his face to explore the way that Facebook had subjectivated him as a radical left-wing activist.

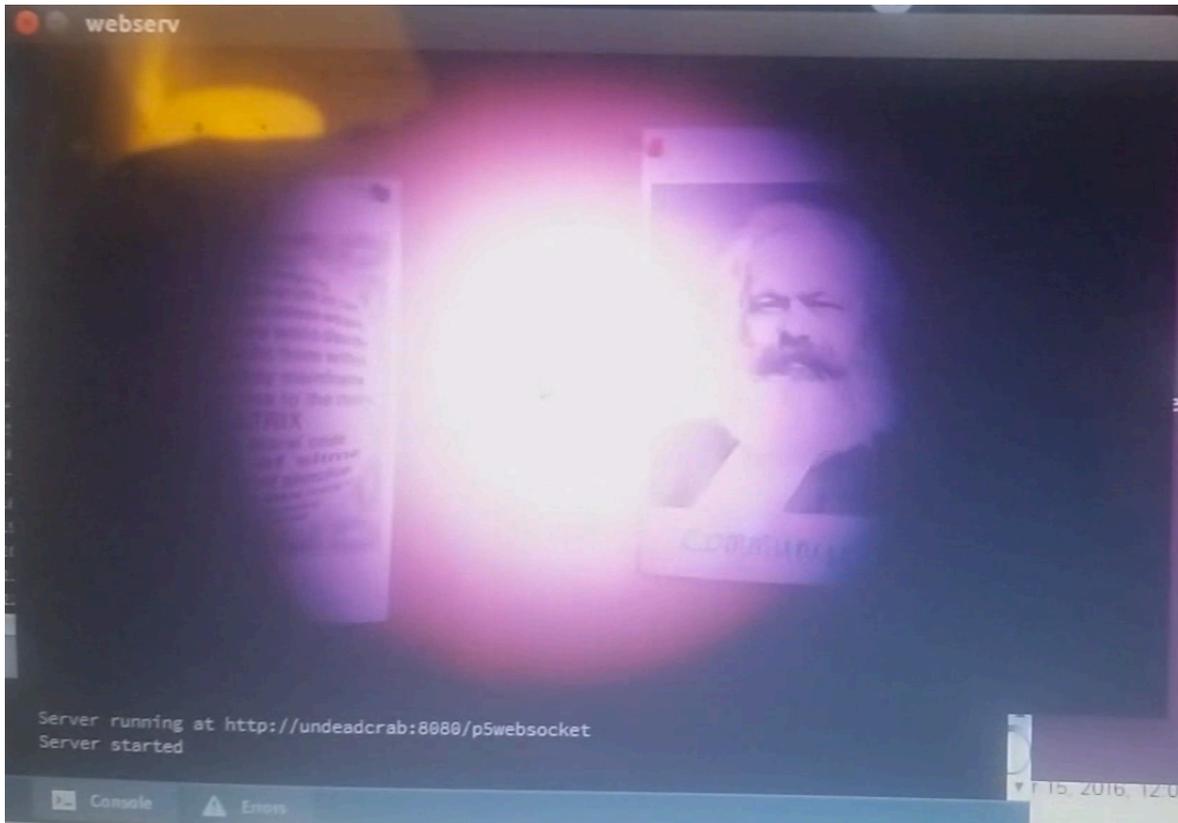


Figure 7. Communist Trappings

These projects focused on the processes of subjectivation that occur through other media, such as games, songs, and books. Although Facebook subjectivates the students based on the media that they consume, it became clear to the students that it was not able to parse why they were consuming this media. For instance, some of the books that were read may be related to a course that the student was taking and not actually a personal interest.

Yet other students were more experimental in their approach. For example, one student created a new Facebook profile in order to see what ads topics would be associated

with a new account. They entered only information about the school they attend, their major, a love for pizza, and uploaded photographs of zebras. This resulted in the following list of ads topics: Music theory, Zebra Print, WomenFreebies, pluto, CollegeInsider.com Postseason Tournament, Ford Thunderbird, Graphics Interchange Format, Obama sucks, All-news radio, Zebra, Taylor Swift discography, Southern Charm, Mellow Mushroom, Tosco Corporation, Appalachia Service Project, and Monopoly. This approach might be seen as following the recommendation by Galloway and Thacker (2007) to exploit that generates false data and trolls social media algorithms. By critically and creatively intervening in these processes through their work, students were better equipped to understand how their use of the site contributed to the data that Facebook collected and make more informed decisions about how to use the service: “One major way that I decided to intervene with Facebook ads is to delete my Facebook account. While the decision to delete my Facebook wasn’t based off the project alone, it definitely helped me to make this move.” In addition to an extreme action such as deleting their account, students also reflected on ways of using the site less. These strategies involved narrowing usage patterns by for example, deciding to use the service only for photo sharing or only as a tool for chatting rather than posting updates.

This strategy of changing use patterns, specifically in deleting one’s account or using Facebook less, in some ways mirror’s Gilles Deleuze’s ([1990] 1995) strategy for the creation of vacuoles of non-communication. While Deleuze argues that this approach is beneficial because it reflects a process of creation rather than communication, such an approach strikes me as problematic because it seems to be more closely associated with a

reaction than a counter-actualization. While addressing this issue in class and at conferences, students and colleagues alike argued for the possibility of a new movement that promotes increasingly widespread vacuoles as a new politics of insurrection in relation to data surveillance. However, I argue that this is simply not feasible in contemporary society. We generate data by simply carrying a cell phone with us, having our license plate captured on camera while driving down the road, and in many more situations where we are simply going about our daily business. Making payments for our house or apartment generates data. If we make a purchase in a store, this is data that gets stored and correlated, even if it is a cash purchase that is not tied directly to an individual person. Even *not* being visible on social media itself becomes a data point, suggesting that we may have something to hide. For these reasons, a true vacuole of non-communication becomes increasingly impossible in the age of big data. Therefore, I tend to agree with the conclusions that my students reached: changing our use patterns for technology is an important first step in altering our processes of subjectivation. However, these changes are always experimental and rely on the media specificity of each particular site, so it is not possible to offer particular strategies that will work well for everyone across social media.

In summary, students found that Facebook's processes of subjectivation were heavily shaped by the site's for-profit nature. This shaping extended past the ads themselves to the way that the content in the Newsfeed was displayed for the students, where much of their subjectivation took place in the form of consuming short, entertainment-heavy updates. Additionally, the site maintains and continues to prioritize the importance of Page Likes.

This meant that the ads topics for many students who no longer use Facebook in this manner felt out of date in a way that made clear Facebook's limited ability to subjectivate students based only a few major types of interaction with the site, despite their vast rental of big databases. Finally, though students struggled present this idea artistically, many were empowered once they began thinking about how a change in their own use habits would intervene in their processes of subjectivation connected to the big data associated with Facebook. In reviewing my students conclusions, I believe that their analysis opens up an even more important question: what would social networking look like if it were set up for nonprofit in the interest of the public good?

Ello and Public Benefit

My students' interventions in their own processes of subjectivation in the previous section revealed that Facebook's approaches to subjectivation all stem in one way or another from the for-profit nature of the site. This finding, in conjunction with Rosi Braidotti's emphasis on non-profit and open source initiatives that we saw earlier, leads to the larger question of what social networking would look like if it were set up according to a nonprofit model. How would this alter the processes of subjectivation associated with that site? The social media website Ello offers an example of what social networking might look like if it were created for social good rather than profit at its core. This change begins at the very outset with a disruption to the traditional binary notice and consent model. Ello offers users the option to change permission settings to allow for the collection of either anonymous,

aggregated data through Google Analytics *or* to completely opt-out of the use of Google Analytics, anonymous or otherwise (“Ello Privacy Policy” 2015). Importantly, even users who originally selected to share anonymous data have the option to revoke that sharing at any time and move to the opt-out model. This represents a first step away from a model of privacy and toward a more fluid relational model that returns the control of a (data)body’s digital traces to itself.

Perhaps most importantly, Ello was incorporated as a Public Benefit Corporation with a legal mandate to never sell ads. Their manifesto reads, in part: “We believe a social network can be a tool for empowerment. Not a tool to deceive, coerce, and manipulate — but a place to connect, create, and celebrate life. You are not a product,” (“Ello Manifesto” 2014). Ello generated significant attention and funding when it emerged as an alternative social networking space at the point when Facebook first required the use of one’s legal name (Fitts 2016). However, the site has since rebranded, using the slogan ‘The Creator’s Network.’ It is primarily targeted toward artists and other creators as a place to collaborate with others and sell their work. Although this might be read as a problem associated with creating a non-profit alternative to Facebook, it is worth noting that other for-profit social networking sites have also needed to brand themselves with a unique feature to find success. For example, Instagram focused exclusively on photos while Snapchat featured self-deleting communications. In this sense, it is unclear whether Ello’s rebranding is a result of its being a nonprofit, or just another social networking site that needs its own spin to survive in light of Facebook’s continued success. One further distinction for the site is that in 2016, it also

embraced an open source by default approach, in which their source code is shared freely via GitHub (Zeschin 2016).

Yet, the question that immediately jumps to the forefront is how such a strategy can possibly be sustainable in the long run considering the expenses associated with keeping the service running. In my conversation with Mark Andrejevic, he emphasized the importance of an infrastructure that does not rely on monetization through data collection or enforced scarcity, but would perhaps mirror public infrastructure such as NPR or BBC (Sylvia IV and Andrejevic 2016). For example, the site might rely on donations in the way that a large nonprofit site like Wikipeda does. However, Ello is attempting to forge a different path. First, the owners claimed that they would do this through selling premium features to interested users. However, this model still seems to be very much in flux. So far, Ello has started initiatives that raise money by selling limited edition Threadless t-shirts, partnering with print art magazines, and launching its own print magazine (Lopez 2014; “Ello’s 2016 Year-In-Review” email 2017). Each of these efforts has featured user generated content and has provided financial compensation for the use of the work.

Due to its narrowing focus on creators, this example offers only a limited glimpse in what a non-profit approach might look like for a more broadly defined social media service. None-the-less, it provides a vital starting point for extending this type of thinking in a space that has thus far been predominantly inhabited by for-profit ventures. This experimentation with new forms of non-profit social networking is a form of counter-actualization that embodies a nomadic ethic that asks what a body can do, regardless of the eventual fate of this

particular site. Seen from this perspective, Ello's emphasis on becoming The Creator's Network makes more sense. In the next two chapters, I will argue that if we take Gilbert Simondon's suggestion to shift our approach from that of form to information — from the static to the processual — then art emerges as a form of *technē* that more fully opens up experimental approaches to process of subjectivation.

Conclusions

While Facebook continues to be the most popular social networking site, it is clear based on discussions with students that many are no longer satisfied with their use of the site, even as they continue using it. Much of this dissatisfaction is linked to the ways that Facebook uses data to subjectify its users. The path to profitability for other social media sites has also obscured the advertising and monetization models that underlie these efforts. For example, many sites raise a significant amount of startup funding and begin offering their services ad-free. It is only later that the advertising model develops and is added to the product. Twitter and Instagram both followed a model such as this. Therefore, to the casual user, it may not be immediately clear that Ello makes a distinction in its composition as a for public good organization.

One important contrast is that Facebook has well-established practices that have been tested to maximize profit. Ello is still actively changing and experimenting with the way its core features operate. This experimental approach certainly embraces a Spinozan ethic, but makes it harder to actively study the associated processes of subjectivation. One major

difference from the perspective of subjectivation is that Ello encourages the creation of communities through the mechanism of creating additional accounts on the platform. Other people will then follow the account and submit material to be featured. While in some ways this approach resembles a Facebook page, it is focused on broader topics and individual users are expected to take the lead in maintaining and curating the communities. One example of this is a community that has been organized around glitch art and pixel sorting, as seen in Figure 8. The processes of subjectivation associated with these communities encourage users to actively come together to explore a topic, submitting one's own work as a form of participation. A comparison between the two sites is difficult because Ello also does not connect to big data in the same way that Facebook leverages data. Therefore, it is less immediately clear how one might intervene in data practices using strategies similar to those students crafted for Facebook.

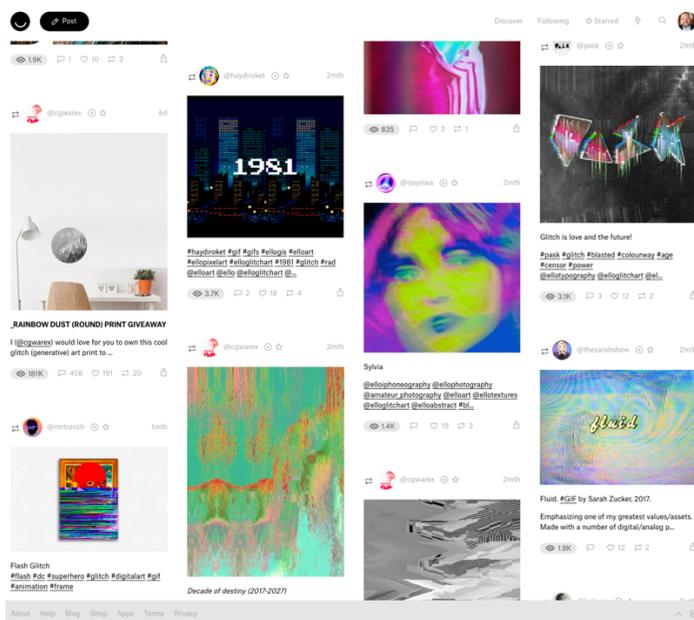


Figure 8. Ello Glitch Art Community

One future direction for research then, would be the development of a directed intervention for Ello in which students could partake in a manner similar to their interventions for Facebook. However, this intervention would by necessity look much different, because Ello has already shifted the processes of subjectivation that relate to data storage and monetization. This also seems to suggest that the processes of subjectivation associated with Ello require a much more active element by default than do those associated with Facebook. The processes of subjectivation occur primarily through the ways that one opts to interact with the site and its various features rather than the way that their data is stored, used, and connected to other big data. Perhaps this is one of the important results that emerges in the shift from for-profit to nonprofit organization.

CHAPTER 6: From Form to In-formation: Ecosophical Approaches to Informational Ontology

“This is, when you think about it, really amazing. The whole dear notion of one’s own Self—marvelous, old free-willed, free-enterprising, autonomous, independent, isolated island of a Self—is a myth.” – Lewis Thomas 1974

In this chapter I develop the core of my informational ontology approach by drawing on the work of both Gilles Deleuze and Gilbert Simondon. This ontological approach will be necessary for developing an affirmative approach to big data in the subsequent chapter; however, I will show in this chapter how it also provides a philosophical grounding for the larger assemblage theory of Deleuze and Guattari, Deleuze’s virtual/actual distinction, and Guattari’s ecosophy. Additionally, I demonstrate that this theory connects closely with developing approaches to the non-unitary nature of the individual as it has traditionally been understood in the field of biology. The informational ontology developed through the work of Deleuze and Simondon, then, can also provide the philosophical underpinning for contemporary biological approaches, making it explanatory of diverse systems of thought and highly fecund, as I will argue in the final two chapters. I begin this chapter through the lens of empirical biology and then develop an informational ontology before explaining how this approach affords the opportunity to theorize about processes of subjectivation at the scale of the city.

Research on the microbiome is challenging the traditional notion of the self as an island—as a separate individual that can be understood apart from its environment. For example, up to 90% of the human body is composed of microbes such as bacteria, and this composition varies over time (Bäckhed et al. 2005; Flores et al. 2014; Gilbert et al. 2012; Ley et al. 2006; Yong 2016) This work has challenged some of the fundamental assumptions in the field of biology, including the standard definition of life itself. As scientists struggle to understand the biological ramifications of this shift toward an ecological perspective, other fields will be likely be impacted by such a shift in a myriad of as yet unimagined ways. In particular, philosophic questions about the nature of identity and agency will need to reconcile such an approach, with potential impacts rippling into ethics and epistemology. Although post-structuralist and posthumanist theories of discourse, media, and subjectivity have long challenged the concept of individualism, this growing consensus across fields will increase the pressure to rethink other theories that rely on a concept of the individual. Communication studies will also have to grapple with this shift in understanding because the transmission model, or standard view of communication that is based on the work of Claude Shannon (Shannon and Weaver [1949] 1998), posits a separate individual sender that transmits information to a receiver. I argue that posthumanism provides the theoretical framework that can best help us understand these biological, philosophic, and communication changes once it is supported by an informational ontology that recognizes the conceptual shift from a static *eidos* (form) to a dynamic *in-formation*.

I begin this chapter with an analysis of microbiome research that is upending the traditional biological notion of the self. I then develop a posthuman informational ontology that can support this biological approach. Such an approach will eliminate the concept of the human as a natural individual, understanding it instead as only one possible arrangement or scale through which to view the world, though one that has long been the focus of analysis. I will explore why the concept of the individual no longer makes sense and necessitates the development of larger ecological or ecosophical approaches.

While Foucault's work opens up the possibility of understanding media through processes of subjectivation, it still needs to be understood within a larger ontological project. I argued in Chapter 3 that the focus on privacy as it relates to the traditional neoliberal subject is no longer adequate, necessitating an affirmative turn. However, this affirmative turn also requires a new approach to understanding the concept of the individual. In this chapter, I will argue for the replacement of the concept of the neoliberal subject with a new understanding of the metastable posthuman as explicated through an informational ontology constructed through the works of Gilles Deleuze and Gilbert Simondon. This philosophic system explains at the ontological level how the process of individuation occurs. It also offers an alternative understanding to the concept of information, moving away from a Platonic conceptualization of *eidos* as an eternal form that echoed through many of the systems that I considered in my genealogical analysis. In contrast to this Platonic and Cartesian notion of disembodied information that is at the center of cybernetics, I will construct a material, embodied conceptualization of information that draws on the

ontological work of Gilles Deleuze and Gilbert Simondon. As we will see, this definition connects to the emphasis on becoming in Aristotle and expands the notion of the constructed subject that is found in the work of David Hume. This project answers Hayles' (1999) and Terranova's (2006) call for the development of an embodied, materialist concept of information and Braidotti's (2013) call for a new theory of the subject that takes stock of the posthuman turn. Such a conceptualization of information is of primary importance for my project because it provides the ontological framework for an embodied version of posthumanism that demonstrates the importance of exploring and experimenting with media-specific processes of subjectivation. This informational ontology is the theoretical core of the entire project.

Informational ontology makes clear that micro and macro conceptualizations beyond the scale of the human are equally important. In contrast to the microbiome, I consider how we might approach the city from a posthuman macro scale. I will argue that the microbiome and the city, understood as assemblages, provide concrete examples of a posthumanist approach grounded in an informational ontology at a practical level. I then link this approach to Guattari's ecosophical theory, which emphasizes the inherent connectedness of everything. This also lends itself well to a citizen-science method more broadly construed so as to utilize information in a way that generates new signals and increases noise for the purpose of inserting novelty and exploring lines of flight – themes I will explore in detail below. From this perspective, informational ontology provides a philosophic grounding for recent microbiome research that upends the notion of the individual while also suggesting a new

posthuman approach to media studies. A citizen science methodology offers a first exploration of this posthuman methodology, which will be more fully explored in the final two chapters.

The Microbiome and Limitations of the Biological Individual

The essentialist emphasis on form that we analyzed genealogically through the history of philosophy in Chapter 4 also has a history in science. Biology, in particular, has long relied on the conception of an essential individual as a unit of analysis. An individual might be defined in a myriad of ways, including anatomically, embryologically, physiologically, immunologically, genetically or evolutionarily (Gilbert et al. 2012). However, microbial symbiosis research is disrupting what was a standard biological research framework: “Symbiosis is becoming a core principle of contemporary biology, and it is replacing an essentialist conception of ‘individuality’ with a conception congruent with the larger systems approach now pushing the life sciences in diverse directions. These findings lead us into directions that transcend the self/nonself, subject/object dichotomies that have characterized Western thought,” (Gilbert et al., 326). Ed Yong (2016) explains in *I Contain Multitudes* that none of the former attempts at defining biological individuals can survive scrutiny in light of microbiome research, even claiming that, “perhaps it is less that I *contain* multitudes and more that I *am* multitudes,” (24, emphasis original). Such language connects closely with Deleuze and Guattari’s (1987) notion of rhizomatic multiplicities in the opening plateau of *A Thousand Plateaus*: “there is no unity to serve as a pivot in the object, or to

divide in the subject,” (8). It is worthwhile to pause and understand exactly why biology is in the process of replacing the concept of the individual with that of the multitude. On the one hand, microbiome research offers practical, concrete examples of the non-unity of the subject, or individual, for what has remained a highly abstract approach within post-structuralism and posthumanism. On the other hand, the informational ontology developed in this chapter can extend current biological approaches by offering the concept of a rhizomatic assemblage in lieu of the concept of the individual.

Anatomically, every “individual” body shares its space with a wealth of microbes, with some estimates showing that up to 90% of the human body is composed of bacteria (Bäckhed et al. 2005; Gilbert et al. 2012; Ley et al. 2006; Yong 2016). An Australian termite, the *Mastotermes darwiniensis*, exemplifies the difficulty of the lens of the individual from an anatomical perspective, as it relies on the gut symbiont *Mixotricha paradoxa*, the “paradoxical being with mixed-up hairs,” (Sutherland 1933) to enable its digestion of the cellulose in the wood it eats (Gilbert et al. 2012). Further, the *Mixotricha paradoxa* is itself composed of five separate genomes. From an anatomical perspective, there is no individual.

Developmentally, numerous “individuals” have been shown to depend on genetic instructions that are derived both from their own bodies and those of their microbes (Yong 2016). Gilbert et al. (2012) outline several examples of this dependence. Newborn squid are only able to develop a light organ through cooperation with luminescent bacteria that the squid absorbs. Mice rely on gut bacteria for the development of their immune system and would not develop normally in a sterile environment. Microbial symbionts are necessary for

this normal development of mammals through interspecies communication via the eukaryotic cells of the so-called host (Gilbert et al. 2012; Gilbert 2001; McFall-Ngai 2002). From a developmental perspective, there is no individual.

Physiological approaches have long conceived of “individuals” as constructed of multiple parts, but microbiome research is demonstrating that it makes at least as much sense to conceive of these relationships from the lens of multiple species living together, such as insects whose enzymes work together with those of bacteria to create nutrients (Gilbert et al. 2012; Yong 2016). Bacteria have been shown to provide functions such as lipid metabolism, vitamin synthesis, and more to their vertebrate “hosts.” Ongoing metagenomic sequencing continues to expand the way we understand the relationship of the so-called human to its own microbial populations as well. From a physiological perspective, there is no individual.

A genetic approach would suggest that an individual inherits one genome that is expressed biologically, however, microbial symbionts have been shown in many cases to offer a second type of genetic inheritance (Gilbert 2011; Gilbert et al. 2012; Moran 2007). Moran (2007) explains that symbiotic relationships have played an important role in many evolutionary events that generate phenotypic variation: “Examples from insects show that symbioses can result in specialized organs with unique development, innovations in metabolic capabilities that allow new lifestyles, defenses against natural enemies and other environmental challenges, constraints on evolutionary range, and ongoing acquisition of novel genes and capabilities,” (8632). From a genetic perspective, there is no individual.

Immunologically, an “individual” was long understood as developing an immune system that would allow it to defend itself from outside pathogens such as bacteria and viruses; however, we now know that the immune system is created, at least in part, because of the existence of the local microbiome (Gilbert et al. 2012). Such development has been observed to occur in vertebrates, insects, and plants alike. The immune system is now understood to also serve as a form of “passport control” that regulates the way the body allows or disallows the entry of others. From an immunology perspective, there is no individual.

This research leads Gilbert et al. (2012) to describe the “self” as dynamic and context-dependent, while Ed Yong (2016) highlights the way that this research demonstrates the connection that all life on earth shares. Citizen-science projects that are being undertaken by scientists at North Carolina State University are pushing our understanding of the microbiome to even greater depths (Dunn 2016). For example, the composition of the microbiome does not only vary from individual to individual but also across time (Flores et al. 2014). The genes of *Bacteroides plebeius* in the human microbiome have a separate Japanese strain that allows it to metabolize the types of complex sugars found in seaweed (Gilbert et al. 2012). However, Flores et al., (2014) using a longitudinal study of 85 adults and profiling the microbial communities of the forehead, gut, palm, and tongue over 3 months, have found that the microbiome has a high degree of temporal variability. The so-called human host, then, does not only acquire microbes at birth and develop a symbiotic relationship with them (Knight 2015). Instead, a dynamic and context-dependent swarm of

selves – held together by habit and a permeable, but real organismal membrane – is connected to all life on earth, is constantly in *flux*, and always changing, or in Deleuzian terms, is always in the process of becoming.

The composition of one's microbiome is also impacted by the tools that one uses. Council et al. (2016) have found that: "...human skin microbial communities are unique relative to those of other primates, in terms of both their diversity and their composition. These differences appear to reflect both ancient shifts during millions of years of primate evolution and more recent changes due to modern hygiene," (1). The authors found that in the absence of deodorant and antiperspirant, the human skin microbiome more closely resembles that of apes. In other words, the use of deodorant and antiperspirant for hygienic reasons alters the composition of the microbiome.

These scientific insights closely mirror the ontological underpinnings of Deleuze's assemblage theory in which: "... a human being (or social group) is as likely to be a *component part* of a larger assemblage as it is to constitute an assemblage in its own right," and is "also a component of many other micro- and macro-assemblages that do not coincide with the biological boundaries of my body or the phenomenological boundaries of my perception and cognition," (Wiley 2005, 76). Microbiome research, by its nature, has tended to focus narrowly on the microbes that make up the macrobial host at the level of the individual as it was previously conceived, such as the "human" or the "beetle." However, an informational ontology, as conceptualized through Deleuze and Simondon, can both make

sense of the biological perspective of the microbiome and allow us to theorize the role of non-biological component parts, such as media.

Informational Ontology: The Metastable Posthuman

While biologists and the sciences begin to adapt to this conceptualization of multitude rather than individual, an informational ontology is already well-suited to explain these shifts in thinking from an epistemological and metaphysical perspective. This ontology deploys a new arrangement of form, supporting a notion of the “individual” that is also dynamic and context dependent. Though scientists such as Gilbert et al. (2012) are using the word *holobiont* to draw a distinction from the classic notion of the individual, this term emphasizes only that the host is made up of smaller symbionts. Other fields such as population biology and epidemiology conceive of the biome at a larger scale through the concept of *populations*, though this often understood in the still somewhat limited sense of a group of individuals within a particular species (Brennan 2013). As we will see, in a posthuman approach as it is theorized through an informational ontology, the understanding of the individual as dynamic and context dependent flows in both directions of the scale — both downward to understand it as composed of smaller, often micro symbionts, but also upwards to understand that the assemblage at the level of the so-called human can also be seen as a smaller part in a larger ecosystem such as a city, planet, or the universe at large.

Additionally, informational ontology will emphasize the process of individuation and the metastable state of the resulting being. Understanding beings as always in the process of

becoming is key, as it pushes back against the possibility of simply understanding the human as a type of super organism made up of smaller individuals. In other words, it guards against shifting the concept of the individual downward to a smaller microbial scale, insisting instead that all of reality exists as assemblage always in the process of becoming. This approach is not focused on what comes after the human, but instead shifts the locus of understanding and discussion to the larger milieu of non-human forces both inside and beyond the so-called human (Hayles 1999; Parikka 2010).

This posthuman perspective creates a metaphysical underpinning for recent scientific analyses while extending them to larger scales, but it is also well suited to introduce a new problem-space of information. An informational ontology is able to escape the resource doctrine of information because it escapes the predominant cybernetic model of information which relies heavily on the essentialized Forms of Plato and the disembodied nature of Descartes' philosophy. Conceived through this lens, information, as well as big data, will be radically opened up to its machinic potential as it drives the very process of becoming.

Simondon (1992) explains how his conceptualize of information will point in new directions:

The notion of *Form* deserves to be replaced by that of *information*. In the course of this replacement, the notion of information must not be associated with that of signals or supports or vehicles of information, *as the technological theory of information tends to do, derived by abstraction as it is in the first instance from transmission technology*. The pure notion of form must therefore be retrieved twice over from the evils resulting from a superficial use of a technological paradigm: in the first place, in

relation to the culture of the ancients, due to the reductive use made of this notion in the *hylomorphic schema*; in the second place, where it exists as a notion of information, in order to save information as meaning from the *technological theory* of information in modern culture. (316)

Cybernetics still relies on an Aristotelian hylomorphism through its focus on analyzing form and particularly behavior (Mills 2016; Ashby [1956] 2015). Such a system leaves out any account of becoming, assuming these already individuated entities. While some cyberneticians see this as a benefit because it allows an uncomplicated analysis at the level of behavior, Simondon argues that such an approach is critically incomplete. In Shannon and Weaver's information theory, as adopted by cybernetics, the messages always travel between a sender and receiver, but these are themselves already individuated entities (Mills 2016). While Weaver's work added the notion of meaning to Shannon's original theory that conceived of information solely in relation to entropy, this approach is both personological and cognitive (Behrenshausen 2016; Shannon and Weaver [1949] 1998). Specifically, Weaver begins his essay by stipulating that "The word *communication* will be used here in a very broad sense to include all the procedures by which one mind may affect another," (Shannon and Weaver [1949] 1998, emphasis original) and information is "a measure of one's freedom of choice when one selects a message," (9). These definitions strictly limit communication and information to the human context, and thus still requires an already individuated (human) entity. Understanding the genesis, or the becoming of these entities is at the heart of Simondon's work, and will move beyond the human-only limitations of

Shannon and Weaver. Information, as we will see, is what drives becoming, and this highlights the body as a living milieu, and also a collectivity instead of an individual (Parikka 2010). In order to more fully understand how this changes the problem-space of information, we will begin by exploring the metaphysical and epistemological consequences of replacing the notion of *Form* with a Simondonian notion of *information*. I will situate this shift within the larger oeuvre of Gilles Deleuze and Félix Guattari, whose work was often inspired by Simondon. Although there is not a perfect match between the philosophic systems of Simondon and Deleuze/Guattari, I argue that putting the Deleuzian/Guattarian geophilosophy into a more explicit conversation with Simondon's conceptualization of information opens up an alternative problem-space for information and big data.

A Deleuzian Ontology via Simondon's Concept of Information

Through his work in *Expressionism in Philosophy: Spinoza* ([1968] 1990a) and *Difference and Repetition* ([1968] 1994), Gilles Deleuze adapts and extends Baruch Spinoza's monist ontology. One of the challenges for developing such an ontological system is explaining how, if there is only one substance in existence, there can appear to be so many seemingly different individuals in existence. In developing his ontological framework, Deleuze draws upon a Spinozist conceptualization of modes, combined with the concept of individuation that has been reworked by Gilbert Simondon.

Spinoza's philosophy was in many ways a reaction to the dualism generated by the metaphysical and epistemological philosophy of René Descartes. Descartes ([1644] 2010)

explicitly recognized only three classes of things: the intellectual, the material, and God (I:48). As we saw in Chapter 4, drawing on terminology that can be traced back to Aristotle, he called each of these things substances. Each substance has an attribute – thought for the intellect and extension for the material – that exists as a mode, which is a particular idea or thing. However, this split not only creates a problem in explaining how the different substances are able to interact or communicate between one another, but also emphasizes the primacy of the mind over the body, and eventually information over matter (Spinoza [1677] 1992; Hayles 1999).

In contrast to this system, and to overcome such difficulties, Spinoza proposed only a single substance, God, or Nature, which has an infinite number of attributes, including thought and extension, the only two to which humans have access:

Whatever can be perceived by infinite intellect as constituting the essence of substance pertains entirely to the one sole substance. Consequently, thinking substance and extended substance are one and the same substance, comprehended now under this attribute, now under that. So, too, a mode of Extension and the idea of that mode are one and the same thing, expressed in two ways. (Spinoza [1677] 1992, 67).

Although understanding all of reality as different expressions of one underlying substance overcomes many of the problems with dualist ontology, such as how to explain the connection between mind and body, it still requires an explanation regarding the mechanism that differentiates substance into these different expressions, or modes. Deleuze leverages the

concept of individuation, via Simondon, to solve just this problem. In *Expressionism in Philosophy: Spinoza*, Deleuze ([1968] 1990a) explains that individuation is related to a mode's existence rather than its essence. Each existing mode has duration (thought) or extension (material), and these are the extrinsic individuations of their attribute.

Further, this process is intensive, precisely because intensity "creates the qualities and extensities in which it explicates itself," (Deleuze [1968] 1994, 246). During a discussion of intensity in *Difference and Repetition*, Deleuze briefly notes the work of Simondon as demonstrating the necessity of a prior metastable state for the process of individuation. From this metastable state, individuation arises "like the actualisation of a potential and the establishing of communication between disparate," (246). This communication between disparate elements in the pre-individual virtual-ideal field creates a coupling that resonates internally. In order to fully understand this resonance as it relates to the prior metastable state requires a detour into the philosophy of Simondon.

Iliadis (2013a) traces Deleuze's acknowledgment of Simondon's influence through several of his works, the most substantial of which I will elaborate upon here. As Iliadis notes, one difficulty in tracing this connection is that Deleuze very rarely uses the word *information* in his own work. Iliadis suggests that Deleuze is *probably* aware of this term and avoiding it so as not to fall back into the cybernetic paradigm. However, Deleuze's review of Simondon's work, republished in *Desert Islands and Other Texts 1953-1974* (2004), explicitly recognizes the role of information in individuation, and Deleuze says in a parenthetical expression: "here we encounter Simondon's preoccupations with cybernetics,

and a whole theory of signification in the relations of the individual,” (88). While acknowledging Deleuze’s apparent hesitation to adopt cybernetic terminology and its potential connection to signification, I think there are important benefits to be gained from understanding the role that this concept plays, as information, in a Deleuzian ontology, as I will explain in the next chapter. Briefly, these include the ability to link information to Félix Guattari’s a-signifying semiotics and to think of big data through a material, affirmative approach.

In addition to his review of Simondon’s work and a brief mention of Simondon in *Difference and Repetition* ([1968] 1994), Deleuze uses a footnote in *Logic of Sense* ([1969] 1990b) to explain that Simondon’s work “has a special importance, since it presents the first thought-out theory of impersonal and pre-individual singularities. It proposes explicitly, beginning with these singularities, to work out the genesis of the living individual and the knowing subject,” (344). He further notes that his work in *The Logic of Sense* depends directly on Simondon. Finally, and perhaps most importantly for Deleuze ([1986] 1988b), in the book *Foucault*, he references Simondon in a passage that emphasizes the way the fold brings the past and future into the present. The individual in this system, always in a process of individuation, is understood as a folding that redeploys all of nature when unfolded (Debaise 2012). This confrontation of the past and future in the living present, discussed in further detail below, is important for not only the process of individuation, but also an affirmative ethics as explicated by Rosi Braidotti (2011b).

Although Simondon's work has been referenced by scholars such as Gilles Deleuze ([1968] 1994) and Bernard Stiegler ([1994] 1998; [1996] 2009), much of this work has largely ignored technical terminology such as *information* or selectively chosen only particular elements of the work to emphasize (Iliadis 2013b; Hayward and Geoghegan 2012). In the past several years, scholars such as Iliadis (2013a; 2013b), Mills (2016), and Scott (2014) have attempted to make Simondon's oeuvre, much of it still available only in the original French, accessible to a larger audience through work in English that summarizes and explicates rather than appropriates. Simondon's primary work is *Psychic and Collective Individuation*, which aims to show how one perceives things as individuals and, related to that, how those things come to exist in the first place.

To begin this process, Simondon builds from Aristotle's concept of individuation over that of Plato because it places the process of becoming internally within an object; however, whereas Aristotle separated form and substance, Simondon rejects this hylomorphism and replaces the notion of form with information (Iliadis 2013a; Scott 2014). Deleuze and Guattari ([1980] 1987) acknowledge this criticism of the hylomorphic model in *A Thousand Plateaus*:

What Simondon criticizes the hylomorphic model for is taking form and matter to be two terms defined separately, like the ends of two half-chains whose connection can no longer be seen, like a simple relation of molding behind which there is a perpetually variable, continuous modulation that is no longer possible to grasp. The critique of the hylomorphic schema is based on 'the existence, between form and

matter, of a zone of medium and intermediary dimension,' of energetic molecular dimension - a space unto itself that deploys its materiality through matter, a number unto itself that propels its traits through form. (409)

Following Hjelt, substance, for Deleuze and Guattari, is a formed matter. In many ways this is similar to Aristotle's analysis of the relationship between form and substance; however, Aristotle begins his analysis with the individual, situating the human as a necessary mediator between sense and form, which is also problematic for Simondon because it only allows the individuation of groups based on inter-individual convention (Iliadis 2013a; Scott 2014).

The problem with a hylomorphic model such as Aristotle's is that form and matter are already structured. In other words, it begins by considering already individuated entities rather than focusing on the process of individuation itself (Parikka 2010). This approach neglects the role of energy in forming matter, as Scott (2014) explains: "It is a matter of metaphysically redescribing what Simondon calls the 'obscure zone' lying between the articulation of form and matter, where the operation of individuation occurs, which brings about their encounter, yet is neglected by hylemorphism," (4). Simondon avoids this problem by beginning his analysis with individuation itself rather than the individual in the way that Aristotle does and further allows individuals to be understood as a relative reality in the manner of modalities (Scott 2014).

Simondon (1995) makes this clear by turning the classic hylomorphic model of human technics on its head. In this model, a mold (form) is understood to shape clay

(matter). Simondon's argument is that both the mold and the clay are already individuated entities and thus cannot explain the process of individuation. Clay, in this example, is not simply un-formed matter, but rather a material that already has some forms such as variable plasticity. The mold is already an individuated entity that was given shape using yet other matter. In other words, the classic hylomorphic example of individuation uses two already individuated entities, only pushing the problem of individuation back one degree. How was clay individuated? The mold? Simondon analyzes the creation of a brick by replacing the concept of molding with that of modulation, which I will discuss in depth in a subsequent chapter. *"Instead of grasping individuation using the individuated being as a starting point, we must grasp the individuated being from the viewpoint of individuation, and individuation from the viewpoint of preindividual being, each operating at many different orders of magnitude,"* (Simondon 1992, 311, emphasis original). In other words, we must understand how the clay itself comes into existence, or is in-formed in the first place. Simondon replaces form with information, which he defines as "the tension between two disparate realities," and it *"emerges when a process of individuation reveals the dimension through which two disparate realities together become a system,"* (Simondon 1992, 311, emphasis original). The concept of form is no longer needed to understand individuation, and has been replaced by information.

This simple reversal to information rather than form eliminates the transcendental gap between matter and its attributes, transforming a transcendent ontology into an immanent ontology. The primary benefit of this transformation is that: "it supposes the existence of any

system as only ever in a state of metastability and, so, always on the cusp of individuating itself.” (Scott 2014, 39-40). Individuation is thus re-conceptualized as an ongoing process. Scott explains that the continuous flux that is part of the process of individuation is necessary for understanding living beings not as an endpoint, but rather as a becoming between individuations. In Deleuzian terms, this means that a human is always in the process of Becoming. Further, Mills (2016) explains that this approach emphasizes a larger milieu because an individual never comes into being on its own, but is instead as part of an individual-milieu dyad, necessitating that relations arise as part of this process itself rather than as something established after individuation. Simondon explains that “the physical individual must be thought of as a chrono-topological ensemble whose complex becoming is made from successive crises of individuation; the becoming of being consists in this non-coincidence of the chronology and the topology” (Simondon 2013, 149, quoted in Mills 2016) The emphasis on a milieu is important because this helps avoid the construction of any form of substantial identity by emphasizing the inherent incompleteness of every individual.

David Hume’s version of empiricism also supports this notion of subjectivity as a process of becoming, with the subject understood as an imprint or impression “left by principles, that it progressively turns into a machine capable of using this impression,” (Deleuze [1953] 1991, 113). Or, in Simondonian terminology: “The transindividual relation develops in a double movement by connecting the interior of the individual to the exterior (‘interiorize the exterior’) while also connecting the external to the individuals interior (‘exteriorize the interior’),” (Mills 2016, 85). This process reflects the creation of a subject.

Rosi Braidotti (2011b) quotes Ansell Pearson (1997) in explaining this system: “An autopoietic machine [the self-organizing subject created by individuation] is one which continuously generates and specifies its own organization through its operation as a system of production of its own components. . . . An autopoietic machine is defined not in terms of the components or their static relations, but by the particular network of processes (relations) of production. The relations of production of components are given only as processes; if the processes ‘stop,’ then the relations vanish. Therefore machines require regeneration by the components they produce,” (140–141). Individual objects, including (post)humans, are only defined by their *relations* with other objects, which allows Deleuze to equate his virtual with Simondon’s pre-individual and his process of actualization with Simondon’s individuation (Deleuze [1968] 1994, 245-247; Faucher 2013). The information that drives this process of individuation is the concept that supports Deleuze’s virtual/actual distinction, gives rise to differentiation, and drives the process of becoming.

How does Simondon conceptualize the information that he posits as a replacement for form? Rejecting a predominant cybernetic conceptualization of information as negentropy, he suggests that it has no structure, content, or meaning, but is inseparably entangled with matter and energy as the tension between two disparate realities, or between the virtual and the actual (Iliadis 2013a; Faucher 2013; De Boever, et al., 2012). Understanding information as the tension between two disparate realities connects the concept of information with other terminology in Deleuze’s work. It is worth noting briefly the language that Deleuze uses to explain this concept. Sauvagnargues (2016) argues that Deleuze uses the term simulacrum

instead of information. Such a substitution makes sense when understood in the context of Deleuze's reversal of Platonism in *Difference and Repetition*. Here, Deleuze engages with the concept of the Form as Plato relates it to the simulacra. The motivation for Plato's theoretical concept of Form was to select, or sort out "(literally 'to make the difference') between true and false images" (Smith 2006, 4) or, in other words between the true Form and the copy.

For Plato, this problem occurred within the specific context of Athenian democracy and the issue of rivalry — highlighted by the rivalry between philosophers and sophists, as noted in Chapter 4. Plato creates the Form as a concept to sort out the false claimants from the true: "If the foundation of essence is defined by the original and superior identity or *sameness* of the Idea, the claimant will be well founded only to the degree that it *resembles* or imitates the foundation." (Smith 2006, 9). Within this system, one can move closer to or further away from the foundational Form. The furthest away from this foundation is the simulacra, or the Sophists. The *Phaedrus* and *Statesmen*, dialogues ascend toward the foundation through *irony*, while the *Sophist* dialogue descends through humor toward a false copy. Smith (2006) argues that this descent "can make no appeal to a foundational myth or model, for it is no longer a matter of discerning the true sophist from the false claimant, since the *true sophist is himself the false claimant,*" (10). This paradoxical conclusion leads Deleuze to write: "By dint of inquiring in the direction of the simulacrum, Plato discovers, in the flash of an instant as he leans over its abyss, that the simulation is not simply a false copy, but that it calls into question the very notion of the copy... and the model." ([1969]

1990b, 294). Irony is pushed to its limit in humor, suggesting the grounds for the overthrow of Platonism.

The concept of the Form is created by Plato to eliminate the simulacra as means of accessing knowledge. Therefore, overturning Platonism would instead mean affirming the simulacra. In his inversion, Deleuze creates an entirely immanent simulacrum founded on difference and defined by three characteristics (Smith 2006). First, the simulacrum is conceptualized as an image without resemblance (Deleuze [1969] 1990b). Second, by consequence of the first characteristic, the simulacrum is understood as difference-in-itself, which is a force placing disparities in communication (Smith 2006; Lawlor 2003). Deleuze explains this as such: "Things are simulacra themselves, simulacra are the superior forms, and the difficulty facing everything is to become its own simulacrum... The important thing, for the in-itself, is that the difference, whether large or small, be internal" ([1968] 1994, 67). The problematic mode of the simulacra is no longer that of an imitation but a challenge "to the very idea of a model or privileged position that is challenged and overturned," ([1968] 1994, 69). By removing the privileged point of view of the Platonic Form, the simulacra takes on a positive conception. Rather than rejecting Platonism entirely, Deleuze simply starts with the simulacra and acknowledges its immanent being: "Simulacra are those systems in which the different relates to the different *by means of* difference itself. What is essential is that we find in these systems no prior identity, no internal resemblance: it is all a matter of difference." ([1968] 1994, 299). Deleuzian ideas then are immanent to the simulacra and based on difference rather than identity. Plato's difference was external

(transcendent) and based on Forms. Deleuze's difference is internal (immanent). In other words, Deleuze is overthrowing the Platonic concept of *Eidos*, but using Plato's own concept of the simulacra as a way of doing so. Simondon overturns the concept of form in much the same way, but uses the term information rather than simulacra.

However, Deleuze drops his use of the term simulacra in his work after *Logic of Sense*. Smith (2006) argues that this is because Deleuze moves on to create his own ontological terminology: "Within Deleuze's own work, the concept of the simulacrum is ultimately replaced by the concept of the assemblage [*agencement*], and the process of simulation is more properly characterized as the process of actualization (or even more precisely, the complex process of 'different/ciation')," (28). Faucher (2013) makes the connection in this way:

Information is differential selection within the milieu in which the thing is constituted as resonance between content and expression, always in a composition of assemblages. Between the virtual and the actual (the former 'contained' in the latter and perpetually unfolding without exhaustion as a 'trace' and a 'dark precursor'), information is 'at work.' Information is at work in the disparation between heterogeneous series, in the milieu of the intensive multiplicities manifest as assemblages. Information attends the process of assemblage, or *agencement*, as a multiplicity of choice." (186)

Though Deleuze does not explicate the dark precursor as explicitly as Simondon does information, he refers to it as a precursor to a lighting bolt—an invisible and imperceptible

force that ensures the communication of peripheral series, tracing its path in advance, but in reverse. Seen in this way, *Difference and Repetition* ([1968] 1994) is a work about information. However, rather than deploying the concept of information in the way Simondon does, Deleuze works within the context of the simulacra, which in later work becomes *agencement*. By connecting these two approaches from Simondon and Deleuze, we have a rich concept of information best understood as in-formation — an ontology that emphasizes and prioritizes change and becoming. Information, then, is what connects and creates.

Said another way, in more Simondonian terms, information enables the resolution between two disparate realities. It is the quasi-cause of the process of actualization, attending to the creation of a new meta-stable state of an assemblage. This process also demonstrates an affirmative approach at the ontological level. Simondon gives the example of the incompatibility of two retinal images: “To resolve bi-dimensional disparation, the human brain integrates it as the condition of coherence of a *new* axiom: tri-dimensionality. Volume, or depth perception, resolves the bi-dimensional conflict by positively creating a new dimension,” (Sauvagnargues 2016, 63). This resolution through creation is an affirmative approach rather than negation of the dialectic. The simplest, and perhaps more commonly cited example that Simondon offers is the growth of a crystal: “The crystalline seed figures this eruption of singularity, which brings the metastable milieu to the point of disparation. The crystal thus emerges as a result, an individuation which creatively resolves the tension between the disparate reals of the mother-liquor and the seed,” (Sauvagnargues 2012, 58-59).

The role information plays here highlights the importance of meta-stability – even after resolution through creation the resulting assemblage remains part of the larger milieu and is always open to further individuation. Information is the continued intensity of relationality (Scott 2014). In short, information replaces form and enables an ontological perspective of meta-stasis rather than stasis, becoming rather than being.

For Deleuze ([1968] 1994), this process of creation occurs during the third synthesis of time—the static synthesis of the future. Here we see how the process of individuation connects with Deleuze’s notion of time. The disparation of the virtual/actual “activates the information and produces a process of individuation that *comes from the future*,” (Iliadis 2013a, 94). The aforementioned discussion in *Foucault* brings together inside-space and outside-space, linking the future and the past in the living present: “Thought thinks its own history (the past), but in order to free itself from what it thinks (the present) and be able finally to ‘think otherwise’ (the future),” (Deleuze [1986] 1988a, 119). It is this ability for the past and future to come together in the present that enables the tendency toward change that is Becoming. Rosi Braidotti (2011b) explicitly connects this to an affirmative politics by emphasizing, not stasis, but *endurance* in space and time by an individual:

In Spinozist-Deleuzian political terms, this sustainable idea of endurance is linked to the construction of possible futures, insofar as the future is the virtual unfolding of the affirmative aspect of the present. An equation is therefore drawn between the radical politics of disidentification, the formation of alternative subject positions, and the construction of social hope in the future. This equation rests on the strategy of

transformation of negative passions into affirmative and empowering modes of relation to the conditions of our historicity. (296)

The process of individuation, drawing from the future as it does, paves the way for the Becoming of alternative subject positions and an affirmative politics. This possibility can be understood further through Deleuze's reading of Henri Bergson. Deleuze explains that Bergson's notion of intuition offers a method that allows us to make use of our own duration to both affirm and acknowledge the existence of other durations (Deleuze [1966] 1988a). Because of the fluid nature of identity, the possibility for future connections and experiments with what a body can do— future becomings—are radically open. We “construct possible worlds through a web of sustainable interconnections. This is the point of becoming: a collective assemblage of forces that coalesce around commonly shared elements and import them to grow and to endure,” (Braidotti 2011b, 96). Although subjectivation comes after individuation, we continue existing in a meta-stable state that is always open to further individuation. In this sense, individuation never ends, it is never complete. So there is a subject that hangs together as habit but can also direct new connections and becomings. We experiment with new assemblages to drive our own change, our own Becoming, and our own processes of subjectivation.

Simondon's notion of information can now be understood as the necessary framework that drives both Deleuze's ontological emphasis on individuation through differentiation, and as the mechanism that enables Becoming and its related ethical and political significance. Both first and second-order cybernetics ultimately disembody information and ontologically

constrain machinic potential while enabling systems of alienation, surveillance, command and control through capitalist systems (Genosko 2014; Hayles 1999; Mills 2015; Terranova 2006). In contrast, the concept of information for which I am advocating answers the feminist critique of information by overcoming the problem of its cybernetic disembodiment. Even more powerfully, it undergirds an ontological system that enables an affirmative politics and allows for an escape from the closed system of technological surveillance. When connected with Guattari's notions of a-signifying semiotics and a-semiotic encodings, as we will see in the following chapter, such a system also enables using technology such as big data and algorithms for generating experimental new processes of subjectivation outside of the traditional capitalistic system. In other words, this definition allows us to think of technics in entirely new and affirmative ways not afforded by competing definitions of information.

Additionally, this ontology offers a philosophic framework that aligns well with the scientific research on the microbiome that challenges the long-held concept of the existence of an individual, as discussed above. As Wiley (2005) noted, this ontological framework of *agencement* allows us to scale in both directions, down to the microbiome but also up to larger scales. However, I would like to be clear that I am not arguing that the world can be divided into localities which each become a site of study. Although we might try to isolate one level of the scale, it is always in a process of individuation (or becoming, or *agencement*) at every level and it must be approached in this way. Feminist physicist Karen Barad (2007) coins the term intra-action as a way to contrast this with the way we normally think about interaction:

The neologism “intra-action” *signifies the mutual constitution of entangled agencies.*

That is, in contrast to the usual “interaction,” which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action. It is important to note that the “distinct” agencies are only distinct in relational, not an absolute sense, that, *agencies are only distinct in relations to their mutual entanglement; they don't exist as individual elements.* (33, emphasis original).

In this sense, intra-action offers a way of thinking about the process of becoming driven by information. It leaves open enough space to understand entities as always only metastable, potentially changing into new assemblages based on the relations to other assemblages. The process of intra-action draws attention to the way that relations between metastable assemblages help generate new processes of becoming. Drawing on this notion of intra-action, Iris van der Tuin (2009) emphasizes the importance of not being limited by pre-existing scales: “‘Intra-action’ enables a way of thinking that moves beyond the existence of isolated and a priori existing entities that subsequently start to interact. A predetermined scale can never be isolated for interaction with another, possibly contradictory predetermined scale. These are all idealisms and, following Barad, we should be studying the ways in which entities, like spatialities, materialise,” (25). With this emphasis on intra-action fully in mind, I turn in the next section to considering the city and its role in the process of becoming. This shift toward the macro-scale will also make clear the connection to Guattari’s work on ecosophy.

Subjectivation and the City

The existence of the microbiome makes clear that the boundaries of the (post)human are quite blurry. While much analytic analysis has focused on assemblages at the scale of the human, this informational approach makes clear that other scales of analysis have been greatly neglected. However, it is only by increasing the scale to that of the city that we can fully understand that in our previous analysis of the human as a stand-alone individual, we were missing a vital component of the processes of subjectivation. Before making this connection, I would like to briefly acknowledge that there is a significant and complex history of understanding the city as an organism, including the concept of a city as an organized body that is based on William Harvey's theory of the circulation of blood and Patrick Geddes' (1947) concept of the biopolis (Horvath and Maicher 2016; Sennet 1994; Welter 2002). Geddes' approach to cities offers an important starting point in understanding them from an informational ontology perspective. I offer a very brief overview of this perspective to show the connection of the city in shaping individuals, before then continuing the development of the concept of the city through a Guattarian assemblage framework.

Geddes understood cities in a much more complex way than a simple organic entity, instead viewing them as one form of life, which he defined as something that processes matter and energy (Welter 2002). Because of this understanding of life as that which processes matter and energy, organisms and nations could also be understood as additional forms of life, all processing at different scales. He views the city as a:

specialized organ of social transmission. It is the vehicle of acquired inheritance. It accumulates and embodies the cultural heritage of a region, and combines it... with the cultural heritage of larger units, national, racial, religious, human. It stamps the resultant product upon each passing generation of its citizens... The city receives the experiences of each passing generation and hands the record on to the next... It is the instrument primarily of the regional memory, but serves also as the memory of larger groups. (Geddes 1947, 57)

Though Geddes acknowledged that social transmission also occurs through other artifacts such as books or music, he gave primacy to the importance of understanding history directly through the city, most notably in the form of taking walks through the city (Welter 2002). This approach to the city leads Geddes to develop a method of conservative surgery which advocates against simply tearing down old buildings and putting up new ones, instead embracing an approach that allows for the adaptation of buildings to modern times while still preserving their history. This helps to build the city as an Open-Air Museum of Centuries (Welter 2002).

Perhaps most important for Geddes is the role of the city as place in his larger social and cultural system. He developed a complex chart of social life, dubbed his thinking machine, which explained how such a process works through four classifications that represented the systems of practical life (place, work), mental life (sense, experience, feeling), inner life (thought, values), and effective life (achievement, community, political action) (Welter 2002; Scott 2016). A constant cycling through these social systems presents a

circular process in which change can be understood as a necessary element of life (Scott 2016). Most importantly, because this process is circular, the role of city as place within the practical life both affects and is affected by political action. The city shapes the individuals who live in it even as they shape and re-shape the city.

A similar, though importantly different approach is required when understanding the city as a macro-view of an assemblage containing buildings, humans, microbiomes, and more. Guattari extends Lewis Mumford's notion of the megamachine to conceptualize the city as the "humans-machines interfaces that define his post-humanism" (Genosko 2016, 243). For Guattari, the subjective city is not a living biological organism, but instead a machinic ecology as the center of his ecosophical approach. Guattari's ([1989] 2008) ecosophical theory demonstrates the complex interdependence and interconnection between the ecologies of the mind, society, and environment. We can increase the depth of our understanding of processes of subjectivation by including the macro-scale of urban and even planetary processes of subjectivation along with those at other scales throughout the assemblage.

On one hand, this understanding deepens through an analysis of collective processes of subjectivation by collective apparatuses such as education, health, and culture (Guattari 2015). But perhaps even more important for Guattari (2015), the fate of (post)humanity and the larger biosphere are closely linked:

That is to say, one cannot hope to recompose a humanly inhabitable earth without the reinvention of economic and productive finalities, urban assemblages, social, cultural,

artistic, and mental practices. The infernal machine of a blind, quantitative economic belief, free of any concern for its human and ecological consequences, and placed under the exclusive aegis of a profit-driven economy and neoliberalism, must give way to a new type of qualitative development, rehabilitating the singularity and the complexity of the objects of human desire. (98)

Capitalism, then, is identified clearly as the infernal machine against which humanity and the larger biosphere is struggling for its survival, in part because capitalism is more than anything else a producer of three forms of subjectivity: the serial (salaried classes), the uninsured, and the elitist (Guattari [1989] 2008, 2015). Yet, the possibility for reorientation of these subjectivities depends largely on changing urban mentalities (Guattari 2015). In other words, the ways we create our relations with the cities in which we live are becoming increasingly important in context of the processes of subjectivation that occur through capitalism, as well as the possibility for developing alternatives. The city is part of our larger social ecosophy that also includes the way we live together as couples and families, for example. Briefly, Guattari defines ecosophy as the ethico-political articulation “between the three ecological registers (the environment, social relations, and human subjectivity)” (Guattari [1989] 2008, 19-20).

How might we rethink the city to generate new forms of subjectivity? Although Deleuze and Guattari ([1980] 1987, 481) describe the city as a striated space par excellence, they also argue that even at its most striated, it gives rise to smooth spaces which can offer a line of flight that escapes capitalist processes of subjectivation. How do we cultivate such

possibilities? In terms of the biosphere, climate change offers the greatest threat. Yet, Chris Ryan (2013), the director of the Victorian Eco-Innovation Lab (VEIL) makes the case that neither the logical scientific arguments nor the stories of potential and actual climate catastrophe have created significant change. Additionally, he believes that such stories may induce feelings of hopelessness that actually prevent action. Such problems connect closely with the earlier analysis of Mark Andrejevic's (2013) argument for the decline of symbolic efficiency. However, drawing on the philosophy of Rosi Braidotti, Janet McGaw (2016) argues that a feminist approach should instead focus on the connectedness of a city as affirmative, creative, and enabling. She makes the case that VEIL does just such a thing through its eco-acupuncture approach, which creates small-scale design interventions that improve the city. This approach has at least some resonance with Geddes' conservative surgery. Examples of Ryan's eco-acupuncture include re-starting geothermal power plants and creating homes that are able to be easily relocated, for example, in the case of climate change induced flooding. These small interventions are important because they follow Guattari's ([1992] 2006) suggestion that to create new points of singularity that can generate affirmative change, it will be important to test new organizations at the small scale first, before later moving to larger implementations. When we approach a city from the Spinozan perspective of what it can do, we cannot know ahead of time how our experiments will turn out. Therefore, smaller tests are a vital precursor to larger changes at the level of the city. Spinoza's own work on the city gives precedent for such an approach. Deleuze writes that "Spinoza describes the City as a collective person, with common body and soul, a 'multitude

which is guided, as it were, by one mind” (Deleuze [1968] 1990a, 266). The importance of scale is prominent in this thinking: “The difference between the way an individual person affects and is affected and the way a state affects and is affected is simply one of scale and complexity” (Adkins 2009, 63). By participating in the city, Spinoza argues, a citizen commits himself to common collective affections, while still maintaining his own thought (Deleuze [1968] 1990a). In this way, we can understand the assemblage at both the level of the human and the city, and the affections that exist at multiple levels. Experimental approaches to what a body can do happen at these multiple levels at once.

One major hurdle to such experimental approaches is that mass media inundate our mental ecosophy with standardization to the point that we can find our subjectivity threatened by paralysis (Guattari [1989] 2008, 2015). Guattari (2015) argues that our subjectivity “loses the taste for difference, the unpredictable, and for the singular event. TV game shows, the *star system* in sport, variety shows, political life, work on subjectivity like neuroleptic drugs which guard against anxiety at the price of infantilization and de-responsibilization” (98). This highlights the importance of the connection between the mental and social ecopsophies. If we lose the taste for difference within the mental ecosophy, the ability to experiment at the level of the social ecosophy becomes more difficult. However, Guattari calls for a social ecosophy approach that “requires the collective production of unpredictable and untamed ‘dissident subjectivities’ rather than a mass movement of like-minded people,” that will sometimes drift together and collaborate while at other times drifting apart (Pindar and Sutton 2008, 9).

However, calls to social action have met with some pushback in light of postmodern theory. Philosophers such as Jean-François Lyotard and Jean Baudrillard have argued for the collapse of master narratives, an auto-critique of any call for social change or agitation as nothing more than language games based on opinion polls and publicity campaigns (Guattari [1989] 2013). Guattari links the rise of these doctrines to the reductionist approach of post-war information theory and early cybernetic research. However, we can escape this impasse, Guattari argues, by shifting away from postmodernism to what he calls the postmedia era. This entails the assemblage of humanity and machinism into a symbiotic relationship:

The emergence of these new practices of subjectification of a postmedia era will be greatly facilitated by a concerted reappropriation of information and communication technologies in so far as they will increasingly authorize: (1) the promotion of innovative forms of consultation and collective interaction, and, in the long run, a reinvention of democracy; (2) the miniaturization and personalization of apparatuses, a resingularization of mediatized means of expression. One may assume, in this respect, that it is the extension into a network of databanks that will have the biggest surprises in store for us; (3) the multiplication to infinity of ‘existential shifters’ permitting access to creative mutant Universes. (Guattari [1989] 2013, 42)

Here Guattari is more specifically intuiting the post *mass* media age, drawing on his experience with the growth of networks through the French Minitel system (Genosko 2013). The later emergence of the Internet, cell phones, and social media align well with Guattari’s vision for the postmedia era, though they have grown alongside mass media rather than

replacing it and are thoroughly axiomatized by capitalism producing a-signifying subjectivations (Lazzarato 2014).

Though this postmedia era has, on the one hand, increased surveillance, it has nonetheless shown significant promise in opening the types of collective interaction and resingularizations of mediatized means of expression that Guattari championed, as demonstrated through events such as the Twitter revolution in Egypt that saw the toppling of the Hosni Mubarak regime. Yet, much of the activity in the postmedia era ultimately has relied exclusively on speech and direct communication⁹. The true power of a postmedia era lies outside of this exclusive focus on the discursive regime, drawing instead on apprehension through affect and a-signifying enunciation (Guattari [1989] 2013, 2015).

We have now seen how both Geddes and Guattari theorize the city in a way that prioritizes its two-way impact with the so-called-human. For Geddes, it is part of a larger cycle of systems that continuously shape one another, while for Guattari, the city can be understood as one scale of an assemblage that includes the (post)human. While the following chapter will more fully explore a-signifying enunciation as part of Guattari's mixed semiotics, I would like to first consider citizen science as a postmedia/posthuman methodology that enables experimental approaches to social ecosophy and also fits well with the Deleuzian/Simondian informational ontology developed above. Perhaps most importantly, it offers a path for generating experimental forms of subjectivity through interaction with larger scales of the assemblage such as the city.

⁹ For an example that decenters the role of social media in the uprising and points to the importance of taxicabs and coffee houses, see Lim (2012).

Citizen Science as Methodology

In addition to insights that citizen science projects are generating about the microbiome, such an approach also offers the beginning of an affirmative methodological framework for collecting large amounts of data that fits well within an informational ontology and provides a strategy for creating experimental processes of subjectivation through one's assemblage with the city. In this section, I will briefly outline current approaches to citizen science as it is used most frequently within science, before then suggesting how this method can be adapted more widely for other disciplines.

Currently, citizen science is most frequently understood as a partnership between professional and volunteer scientists to collect and/or analyze data (Trautman et al. 2013). These partnerships can and do take on a wide variety of arrangements, with volunteer scientists sometimes working to collect samples that are mailed into labs, such as in the case of the School of Ants project¹⁰, or working to analyze and mark data that has already been collected, such as in the Microscopy Matters project¹¹. Several important benefits arise from this collaboration. The large number of people collaborating means that the scale of projects can be extended geographically as well as through time. Projects can now collect more data in one week than a single scientist working alone would have previously been able to collect over an entire lifetime, while also living on long past the lifespan of any single scientist (Shell 2014; Trautman et al. 2013). These data would likely not be able to exist through any

¹⁰ <http://www.schoolofants.org/>

¹¹ <https://www.zooniverse.org/projects/jbrugg/microscopy-masters>

other method (Silvertown et al. 2011; Hulcr et al. 2012). The National Audubon Society's Christmas Bird Count project offers a strong example of this longevity and its potential impact ("History of the Christmas Bird Count"). Launched in 1900 as conservation project focused on counting rather than hunting birds, data collected over the years have now been used to help demonstrate the impact and nature of climate change.

Despite tangible results such as those from the Christmas Bird Count, citizen science is not without controversy. The openness of the project to non-professional volunteers is both a strength that allows the projects to thrive with a wide variety of otherwise unachievable data and analysis but also a potential point of weakness. We can understand both issues through the analogy to stone soup that Caren Cooper (2012) uses to elaborate the benefits of citizen science:

... A group of monks traveling through the war-torn countryside sit in the center of a quiet village and boil a stone in a large pot of water. Soon curiosity wins over the initial distrust and skepticism of impoverished villagers as each, in turn, are enticed to add a vegetable or spice. Through cooperation and sharing, the entire village feasts on delicious, nutritious soup. When my colleagues and I carry out research using citizen science methods, we are like the monks boiling stone soup. Instead of a pot, we have a big blank spreadsheet and curious folk are enticed to each add their observations, ultimately creating a robust database with observations from across a continent. (NP)

Though the benefits of collaboration are obvious through such an analogy, we might also imagine that one of the villagers, acting out of either malevolence or ignorance, comes along

and adds a poisonous herb to the pot, thus spoiling the entire batch of soup and harming others. Analogously, we might worry that the volunteer scientists participating in projects could, again either malevolently or ignorantly, submit bad data to the project that skews results.

There are at least three quite different ways of addressing this concern. The first is to argue that the challenges with data quality presented by citizen science are no different than those presented by all scientific work (Kennedy 2016). For example, one of the major arguments made by the field of Science and Technology Studies over the past few decades is that all science is messy, and this critique is explored in-depth through the metaphor of the golem as a lumbering fool by Harry Collins and Trevor Pinch (1998). They argue that experiments themselves cannot tell us anything important unless we agree that the experiment was done competently; yet, it is precisely in times of controversy that we find disagreements over not only the results, but also the quality of work being done. Therefore, a citizen science approach only repeats old challenges to the scientific process rather than inserting new ones.

Another approach makes the argument that crowdsourcing *increases* the likelihood of correcting erroneous data or at least diluting its “poisonous” effects. This type of argument has been used to explain why *Wikipedia* scores higher than *Encyclopedia Britannica* in terms of accuracy, references and overall judgment (Casebourne et al. 2012). There are also emerging forms of citizen science that control human error by mechanizing data collection. For example, Weather Underground uses a combination of user-run weather stations with

error-checking in the form of surveys that ask visitors whether or not it is raining where they are now located. This type of error-redundant crowdsourcing effort might be seen as actually reducing the margin of error and increasing the quality of data in comparison to other scientific work at large.

However, I am more interested in a third approach to addressing this concern. A Deleuzian/ Simondonian informational ontology approach seeks to “multiply signals, amplify noise, shift away from variables to singularities, acknowledge intensive qualities and not extensive quantities, and only then will the resonant relations between things emerge” (Faucher 2013). This approach is in sharp contrast to previous conceptualizations of information theory which are focused on eliminating noise and communicating a message clearly. Increasing participation through citizen science projects certainly creates the potential for the addition of poisonous herb to the data sets, but it also multiplies signals and amplifies noise in interesting ways that offer the potential for lines of flight that lead to unexpected ideas and results that might not otherwise arise in a project without such participation. For this reason, citizen science aligns well with an informational ontology approach. I am not arguing that a citizen science methodology *only* creates noise or generates lines of flight. The primary function is one of collecting data in order to compose generalizable claims about patterns in the data. However, in addition to this functionality, citizen science offers a greater opportunity for these lines of flight than does other scientific work at large. While this might be viewed as problematic from a traditional information theory perspective, it is a benefit from an informational ontology perspective.

Further, although citizen science has a long history, it is only recently that the internet has afforded the tools needed for projects to quickly generate large amounts of participation. Those at the forefront of developing today's citizen science projects are only starting to realize the potential impact of this approach. For example, by opening up participation to the process of science as widely as possible, previously under-represented or excluded groups can participate in ways that can offer new insight and expertise that was inaccessible to existing experts (Kennedy 2016). In material, feminist terms, this would mean accepting Haraway's (1988) theory of situated knowledges and the perspectives from particular bodies that it entails as significant contributors to scientific expertise.

Increasingly, participation in citizen science, along with the wider availability and use of microsensors, causes the discipline to push up against the traditional challenges associated with big data such as how to store, clean, and analyze the data. One important distinction is that data collected through this process is likely to be open access, as the citizen science method, especially when using public funds, calls for inclusiveness, open access, open data, open communication, and transparency (Kennedy 2016). Thus, even those who might not participate directly in the active aspect of collecting or generating data will be able to access and analyze the data for any purpose, potentially combining it with other unrelated data sets to generate unexpected connections.

While citizen science is already in the process of disrupting traditional science methodologies, it has the potential to include "local citizen science alliances influencing planning, zoning, and economic development plans; or citizens equipped with fitness

monitors, smartphones, and drones contributing to global studies in biomedical science, sociology, ecology, and cosmology” (Cavalier 2016, Kindle Location 168). These are potential uses that expand far beyond the “science” realm of the citizen science model, and the possibilities for its uses in these areas have only just begun to be thought. It is precisely here where citizen science can intersect with the city assemblage. How can we as individuals create projects to generate data and analyze our relationship to the places in which we live? How can we gain insight into the relationships we have with our homes, towns, cities, and states in ways that might radically change the way we think about where we live? What opportunities for conservative surgery or eco-acupuncture might arise when we collaborate and point our citizen science projects toward the city in ways that move beyond the ecological projects that have been created thus far? And how will the changes we make to our city impact both its processes of subjectivation and our own? These are affirmative and empowering questions that lead to many more questions than they do answers.

Nonetheless, it is at least possible to begin the process of imagining these potential futures. In a course I designed, *Big Data and the Rhetoric of Information*, I challenged students to find and visualize open data using either Tableau, a form of traditional data visualization software for which they were provided a free educational license, or p5.js, a freely available javascript-based language meant to enable creative coding accessible to non-programmers. Students with no prior programming or data visualization experience were able to access open data and create meaningful visualizations that offer a glimpse at how we might start to think about connections to our cities. For example, one group created a

visualization that showed bank closings in the years surrounding the Great Recession of 2007-2009 (See Figure 9).

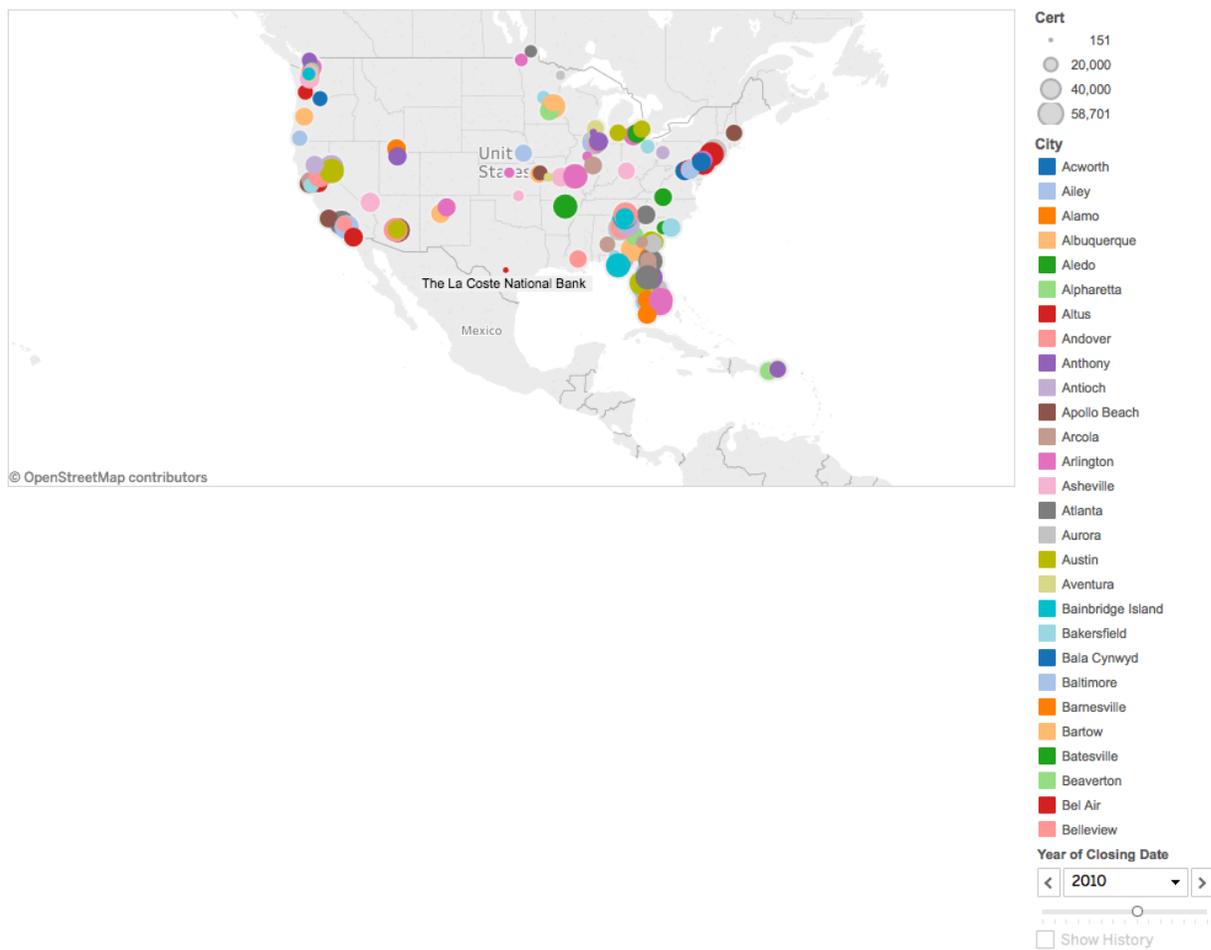


Figure 9. Visualizing Community Impact

Source: Matt Starr, “Big Data: The Financial Crisis Through Bank Failures.” Tableau Public. https://public.tableau.com/profile/matt.starr#!/vizhome/Big_Bank_Data/Story1.

March 2016.

This particular visualization helps us understand (at the scale of the country) where the largest impacts occurred. My interests in this approach go beyond any particular visualization such as this one. Certainly there are skilled professionals who have been creating stunning and insightful visualizations for quite a long time. The important difference here is that this visualization was created using freely available data by a non-professional. This connects to informational ontology and subject formation through its emphasis on experimentation at different scales in ways that are accessible to citizens involved in the communities, as elaborated further below.

Of course, this is only the first step. In the United States, during the Obama presidential administration from 2008 to 2016, both federal and state government agencies began rolling out open-data platforms. From a citizen-science perspective, what holds even more potential is the ability for individuals to collect and store data in a similarly open format. While much of the citizen-science data that has been collected about the communities has thus far been environmental in nature, the possibilities are limited only by the imagination. For example, what new ways of thinking could arise when we connect our citizen science approach to work on building smart cities? Although this work has been started in some areas, early results show that there is very little overlap in these two efforts and they rarely are able to share data (Craglia and Granell 2014). One of the lessons of big data has been that combining disparate data sets leads to new insights. As governments publish more open data and citizen science and smart cities start creating frameworks that facilitate the collection and sharing of data, the possibilities for individuals to use and

combine this data will only increase. When data is used in this way the tensions between disparities become clearer at larger scales. Individuals are then able to intra-act with these disparities to resolve the tensions and drive new becomings. For example, areas of the country that were impacted most heavily by bank closings might be more open to experimenting with micro-lending practices in the absence of being able to use local banks for small loans. It is the original open data and visualization that create new opportunities to see the processes of subjectivation at larger scales, which further enable the potentials for experimental interventions. Exactly what this will look like is still difficult to project, precisely because these are scales that have not been considered as often, and have previously been more difficult to assess. It is the potential for entirely unexpected findings and results which is most exciting.

As a method, citizen science allows and even encourages what Guattari ([1989] 2013) calls dissident subjectivities. He argues that we must have a social ecology of unpredictable and untamed dissidents who can come together and move apart without a central leadership, as opposed to a mass movement of likeminded people. A citizen science approach allows exactly that. A group can come together out of shared interest to create a project and later split up and move on to work with other unrelated projects. This is the true potential of citizen science. It is impossible to know or predict ahead of time what connections will be made or what ideas will arise out of such participation. But this type of participation seems well-suited to create new ways of thinking about our relationship with the cities and communities in which we live. For Guattari (2015), this entails thinking about other modes of

subjectivity outside of the polarized values of capitalism, modes that might include solidarity, aesthetic, or ecological approaches. In other words, dissident subjectivities can come together and break apart, suggesting, proposing, and discarding a variety of ideas and approaches. This citizen science approach increases the noise and multiplies signals, which, from an informational ontology perspective, opens the possibility for experimentation. Experimentation, in turn, can create new singularities and alter the processes of subjectivation that are part of our city assemblages.

Conclusions

In this chapter I have developed the core of my informational ontology approach, highlighting the need for analysis of assemblages at scales both larger and smaller than the human. This posthuman approach not only aligns well with current research on the microbiome that destabilizes the long held notion of a separate individual as an island, but also demonstrates the importance of extending the scale of analysis upward to larger subjects such as communities, cities, or the planet as a whole. After elaborating on the concept of a city as a subject at a larger scale of assemblage, I suggest that citizen science provides an experimental methodology that can be applied at the scale of the city (and larger), opening up participation to many participants and creating the possibility for new lines of flight.

Certainly there is a potential critique of citizen science and the technology of which it makes use in which these technologies are seen as further instruments of surveillance and control. While this is a possibility with any form of technology, I have argued throughout this

project that these experimental arrangements are nonetheless worth pursuing. In the next chapter I will also argue that even if technologies are explicitly used for surveillance and control, there exists inherently in these technologies a randomness that offers new lines of flight and escape from such surveillance and control. Further citizen science approaches avoid the capitalist regimes that give rise to at least some of the surveillance and control aspects of technology. As we saw through the social networking example in the previous chapter, nonprofit and for-public-good approaches can dramatically shift the processes of subjectivation associated with a technology or medium. Therefore, the more widely these approaches can be propagated, even when they exist within a larger capitalist system, the more such dissident subjectivities will also be propagated. One major component of spreading this dissident subjectivity approach is through artistic regimes. In the remaining two chapters, I will explore the importance of artistic approaches to intervening in processes of subjectivation and further theorize the ways in which such artistic approaches can be combined with citizen science and other methodologies to create both a theoretical and practical research “toolkit” for posthuman media studies.

CHAPTER 7: Destroying the Human Face of Big Data

“We believe only in a Kafka *politics* that is neither imaginary nor symbolic. We believe only in one or more Kafka *machines* that are neither structure nor fantasm. We only believe in a Kafka *experimentation* that is without interpretation or significance and rests only on tests of experience.” – Deleuze and Guattari [1975] 1986, 7

In Chapter 2, I argued that current approaches to big data could be interpreted as facializing humans into the dominant system of control society. However, Deleuze and Guattari (1987) have argued that the face can be dismantled through an a-signifying approach. And it is art that serves as a tool for blazing new lines and becomings. “Beyond the face lies an altogether different inhumanity: no longer that of the primitive head, but of ‘probe-heads’... Become clandestine, make rhizome everywhere, for the wonder of a nonhuman life to be created,” (Deleuze and Guattari [1980] 1987, 190-191). Big data offers us a chance to glimpse beyond the signifying scale of the human and the face and to create nonhuman probe-heads. It offers an opportunity to experiment in ways that replace the signifying and subjectivating nature of our current assemblage by using a-signifying data approaches to think beyond the human scale.

In this section, I will connect a-signifying semiotics with the informational ontology that was developed in the previous chapter. Once we see how these two concepts connect, it

will then be possible to theorize an alternative approach to big data. This material, a-signifying approach to big data will not only generate new approaches to experimenting with processes of subjectivation, but will also underscore how such an approach makes possible the thinking of larger cognitive assemblages, in much the same way that the image of the cinema made possible the thinking of an affective sensory for Deleuze.

In order to construct this alternative approach to big data, I will first explore the connections between the emerging field of biosemiotics, Guattari's mixed semiotics, and Hayles' cognitive assemblage. Drawing on these three approaches, I argue for a machinic approach to a-signifying semiotics that, when understood as part of such a machinic assemblage, will further the ability to ethically and aesthetically experiment with one's own processes of subjectivation through the construction of an art machine that functions through modulation. Though scientific and philosophic practices also offer revolutionary potential, it is art that offers the most opportunity for experimentation with processes of subjectivation, especially in light of the rise of big data. Next, in context of this modulation, I theorize a material approach to big data understood as a trace, which in the process of modulation, can feed-forward the data collected in order to help a particular assemblage better intervene in and experiment with its processes of subjectivation at multiple scales, escaping the framework of modulation that exists within the control society. Finally, I argue that such an assemblage can never be entirely predictive of the future because it is not limited to a closed system, but rather part of a radically open universe that is always in the process of becoming. Further, information is inherently unknowable, always leaving open the possibility for lines

of flight and destroying the human face of big data. In the following sections, I elaborate each of these steps in further detail.

Biosemiotics

The attempt to understand semiotics from a broader perspective than that of language alone has gained a significant following since the late 1990s. Biosemiotics is an interdisciplinary approach to developing a theory of biological communication that is something more than “machine-like exchange of information,” (Hoffmeyer 2009, xiv). The machine-like exchange of information, of course, has deep roots in the philosophies of Plato and Descartes as well as the mathematical theory of communication created by Shannon and Weaver. Descartes’ philosophy set living beings apart from the natural world through the de-semiotization of their communicative processes, thus facilitating Shannon’s rejection of meaning in information due to its lack of specifically *symbolic* meaning (Favareau 2009; Hoffmeyer 2009). In contrast, biosemiotics develops a theory of communication that is rooted in an understanding of semiosis that acknowledges the role of biological entities in the process of interpreting signs. Doing so requires a rejection of scientific knowledge obtained by the “view from nowhere” (Nagel 1989), the elimination of anthropomorphism, and the avoidance of eliminative reductionism.

Both mathematical information theory and evolutionary theory neglect the role of biological entities in communication because of Descartes’ cleaving of the mind and the body that we explored in Chapter 4. Descartes ([1644] 2010) focused exclusively on the *body* and

its related motion in his natural philosophy, which influenced the work of Isaac Newton and the eventual development of the field of work now known as science. Favareau (2009) argues that, while this study of bodies led to significant scientific achievement, the study of the mind suffered because it was equated with the linguistically shaped human mind. Scientific study of the body thrived because it recognized that bodies occur in many different ways among various entities, facilitating a range of different approaches to biological functions such as reproduction and locomotion. Conversely, recognition of the mind was limited to a human mind that functions through symbolic cognition. However, this approach to the mind and ultimately communication is just as limiting as would be a scientific approach that only understood bodies as biped mammalian human bodies. Just as there exist multiple forms of reproduction that range from live birth to spore formation, we might also recognized multiple ways of knowing:

Are we to say that the self-reflexive ability to symbolize its own experience and articulate that set of symbols to another *constitutes the criteria* for knowing *per se*? If so, then the bee can never “know” what flower to land on, the deer can never “know” which other animals in its surround to mate with and which to flee from, the penguin can never “know” which chick is her offspring, and—in fact— all other living beings except the human essentially [are] the input/output automatons that Descartes claimed they are. (Favareau 2009, 19)

Favareau is arguing that the animals and insects in his examples must “know” things because they clearly are not automatons in the way that Descartes had claimed they were. An

important task for biosemiotics is teasing out what exactly is meant by “knowing” in this context. The anthropocentric nature of both communication and knowledge becomes clear through this biological example. The field of biosemiotics asks how semiotics can be thought beyond the context of the human.

The strategy for constructing an answer to this question entails the development of a clear understanding that the thoughts, meanings, symbols, and culture that have long been attributed solely to the human mind arose from and are grounded in the natural world (Favareau 2009). In other words, human communication and knowledge are products of natural processes. Just as natural processes have given rise to different physical processes that afford reproduction, they might also have given rise to different mental processes that afford communication and/or knowledge. Biosemiotics, then, will ask questions such as “what particular *relations* in the naturally occurring world does human symbolic understanding exploit differently, say, than primate indexical understanding does, or that iconic relations chemotaxis affords for the amoeba?” (Favareau 2009, 19). These questions broaden the range of activities that one’s theoretical framework allows one to interpret as an act of communication, moving well beyond the Shannon/Weaver model. In *Other Minds*, Peter Godfrey-Smith (2016) traces the way that sentience — a precursor to consciousness — arises from the evolution of sensing, acting, and signaling. While this work is not situated within biosemiotics specifically, it offers an in-depth case study of another form of knowing that occurs—that of the octopus. Godfrey-Smith traces the separate but parallel evolutions of consciousness in different evolutionary branches. In the case of the octopus, we see another

living being that clearly has consciousness, yet does not communicate through symbolic cognition. John Durham Peters (2015) similarly discusses the possibilities and limitations of dolphin communication in *The Marvelous Clouds*.

Based on these foundational approaches, biosemiotics research has expanded in a wide variety of ways that are not always compatible. Despite these differences, there are a few major points that cut across biosemiotic approaches:

A sine qua non for a biosemiotic approach is the inclusion of the activity of organism, or subjectivity, as anything real and describable. The inclusion of subjectivity is done in terms of sign processes. Semiosis, a sign process, is itself the mechanism of subjectivity, which is the mechanism of making choices,” (Kull 2011, 126).

The link between subjectivity and biosemiotics offers a glimpse of how such work could potentially connect to the work of Foucault and Guattari on processes of subjectivation. In much the same way that current work on the microbiome and the non-unity of the individual aligns with an informational ontology, biosemiotics aligns quite well with the mixed semiotics of Guattari. In explicating the connections between the two systems, I aim to demonstrate not only the broader disciplinary connections of a Guattarian semiotics, but also the types of empirical questions that such a system can address. However, one important caveat for biosemiotics is that it remains in large part focused only on *living* organisms, precluding the possibility of meaningfully theorizing the role of technics in semiosis.

Therefore, while there are resonances between biosemiotics and informational ontology, we

will need to revisit and incorporate Guattari's mixed semiotic theory in light of more recent work in biosemiotics.

Mixed Semiotics

In this section I plan to elaborate a coherent approach to mixed semiotics, connecting writings that span multiple works by Deleuze and Guattari. I will then extend this mixed semiotic approach to develop the concept of data as a material trace, offering the possibility of theorizing and utilizing big data in ways that are not entirely captured by capitalist regimes. A first important step in this process is understanding the connection between information and a mixed semiotics. In *Guattari: A Critical Introduction*, Gary Genosko (2009) explains that information precedes signification and is the site for the study of a-signifying semiotics. Brian Massumi, in describing Simondon's conception of information, argues that it would be a-signifying, which would make signification invention (Massumi et al. 2013). Although this makes sense from a more traditional conception of information, I argue that information as understood from a Simondonian perspective is actually a-semiotic, because it is a natural encoding independent of semiotic encodings, or in other words, is a transduction as opposed to a translation. It does not make use of a separate semiotically formed substance. This can still be understood as a form of invention, and further, information can be mixed with signifying semiotics to generate an a-signifying semiotics used for deterritorialization. This development goes beyond cybernetic understandings of information, including various formulations by Shannon and Weaver, because they "never

ultimately get beyond signification and remain trapped in an intermediate phase where machinic potential is constrained by the vagaries of what Guattari dubs 'human understanding', which slows down an otherwise accelerating destratification of meaning," (Genosko 2014, 14). This critique is quite similar to the one being made by biosemiotics. In order to understand more fully why this designation of information as a-semiotic and a-signifying is important, we will have to explore how these concepts are defined, as well as how a-signifying semiotics arises from an informational ontology and what role it plays in the processes of subjectivation.

Shifting our understanding of ontology in a way that prioritizes the process of becoming over being is what enables Deleuze and Guattari ([1980] 1987) to say in *A Thousand Plateaus* that a regime of signs is much more than a language because it enables one to see that language overcodes other strata that only appear to be linguistic but actually extend beyond language. The expansion of the regime of signs beyond language is noteworthy because it allows for the expansion of semiotics beyond the human in a way that opens up new relations and connections in a collective assemblage of enunciation. Understanding how this works, though, requires exploring the difficulties associated with an ontology of becoming.

The constant state of flux and flow in the process of becoming requires the development of an explanation as to why assemblages seem stable; however, we saw in the previous chapter that this is not true stability, but rather metastasis and meta-stability. This aligns with the process of individuation discussed above, but is interpreted with slightly

different language in *A Thousand Plateaus*, which makes additional connections to language. For Deleuze and Guattari, this entails the creation of multiple strata that give form to matters by imprisoning intensities and locking singularities into systems of resonance ([1980] 1987, 40). The key is that they identify three types of stratification, which allow them to separate linguistic stratification from physical and organic. The temporal language of the linguistic strata distinguishes it from the other strata in that it has the capacity to translate rather than induce or transduce. Translation in this context goes beyond merely representing other languages and instead allows language to represent the other strata. The temporal linearity of language, however, allows it to overcode the other strata in the process of passing the same form from the substance in one strata to the substance in another strata ([1980] 1987, 59-63).

This process of translation is responsible for three illusions that have driven the structuralist elevation of language. First, translation gives the illusion that strata are hierarchically organized by giving primacy of the signifier over language, which seems to give primacy to language over all other strata ([1980] 1987, 63-64). Such an emphasis on signifier creates the illusion of the necessary mediation of language, which, in the third place, seems to suggest the necessity of the human in the process of mediation, thus generating an anthropocentric perspective. In opposition to this view, Deleuze and Guattari suggest a reciprocal relation among strata. They explain that there do exist forms of expression without signs, such as the genetic code, and these signs are not necessarily all signifiers because significance is only one regime among a number of semiotic expressions, or expressions

without signs, which includes a-semiological regimes of signs and a-signifying signs located on the plane of consistency ([1980] 1987, 67-68).

Structuralism goes wrong by seeing the signifying regime as the only possible model. In *Molecular Revolution*, Guattari ([1977] 1984, 74-75) instead envisions a semiotics that is not based on the bi-polarity of the signifier and signified and is instead constructed in this way:

1. A-semiotic encodings are any natural coding which functions independent of semiotic encodings. An example of such an encoding would be genetic code or crystalline systems.
2. Signifying semiologies are based on a system of signs on the plane of content and expression and can be further broken down into two categories that include:
 - a. Symbolic semiologies bring substance into play through acts such as gesture or inscription on the body. Guattari also gives the example of the creation of 'worlds' of childhood or madness. These worlds can never be fully translated into a system of signification, thus retaining their symbolic status.
 - b. Semiologies of signification make use of dedicated substances of expression such as sound (speech) or inscription (writing). These systems generate writing machines used by State power to seemingly reduce all other semiotic substances to the signifier. This is part of the process of linguistic overcoding that occurs.

3. A-signifying semiotics are the same as what are called postsignifying semiotics in *A Thousand Plateaus*: a-signifying machines remain based on signifying semiotics, but use them as a tool of deterritorialization to make new connections. Signs and things engage one other outside of the control of individual agents.

The difference between signifying and postsignifying regimes is further explored in *A Thousand Plateaus*. The postsignifying regime has a positive relation to a line of flight that is made possible by betrayal. The point of subjectivation is where a line of flight begins, and is called a proceeding (Deleuze and Guattari [1980] 1987, 137-147, 209). An example of this proceeding is:

The songs of black Americans, including, especially, the words, would be better example, since they show how the slaves “translated” the English signifier and made presignifying or even countersignifying use of the language, blending it with their own African languages just as they blended old African work songs with their new forced labor; these songs also show how, with Christianization and the abolition of slavery, the slaves underwent a proceeding of “subjectification” or even “individuation” that transformed their music while the music simultaneously transformed the proceeding by analogy. (Deleuze and Guattari [1980] 1987, 137).

Kafka’s work offers another example. When Gregor Samsa wakes up as a bug one morning, this is a point of subjectivation from which a line of flight follows (Deleuze and Guattari [1975] 1986; Adkins 2015). These proceedings are linear and segmented, and individuals can and do follow multiple lines of flight simultaneously. In other words, we each have multiple

points of subjectivation from which are we proceeding at any point in time. This point of subjectivation determines a mental reality that produces a subject of enunciation and a subject of the statement that gets normalized, similar to Foucault's notion of normalization. Deterretorializations of signifying semiotics are only relative, because any sign that tries to escape is assigned a negative value as a scapegoat (Deleuze and Guattari [1980] 1987, 117). However, for postsignifying regimes, there is absolute deterretorialization, which is assigned a positive value. Regimes, though, are always actually mixed.

The postsignifying regime, then, is what allows for the possibility of positive deterretorializations, which is when a line of flight overcomes reterritorialization, extending its path and making new connections. Guattari ([1977] 1984) explores the effects of this regime on subjectivity in *Molecular Revolution*. Structuralist analyses mask the duality between content and form by focusing only on form. Intensities get reduced and rendered impotent, generating a subjectivity that is detached from the real. Guattari argues we need to get rid of this opposition, and rather than trying to keep content and form separate, look for points of connection. He argues that the position of the subject changes drastically when a-signifying semiotics come to the forefront. Signs and things engage one another independently of subjective control. By avoiding the control of individuals, a-signifying semiotic machinism is bound up with various processes of deterritorialization. This destroys modes of representation that are humanist and broadens desiring production to the totality of a-signifying semiotics. This opens up to new machinic connections so that the “collective apparatus of utterance can thus become the centre of immanence, for new desiring

connections, the point where, beyond humanity, there is production and *jouissance* by the cosmic fluxes that run through machinisms of every kind,” (Guattari [1977] 1984, 98). An example of this machinic connection is a magnetic strip on a debit card that activates accounts and opens access to resources (Genosko 2014). Such a decentering of human agency achieves one of Guattari's philosophic goals, and allows a-signification to become a "non-human enunciation in and among machinic systems," (Genosko, 2014). But to what effect?

Signs work directly on material flows, enabling the body at all levels of Guattari's ([1989] 2008) three ecologies to be defined by affect. There is no longer representation, only action upon the real: “With the affective turn we abandon the semiotic register, since the linguistic distinction between sign and referent loses its relevance. More importantly, we shake off the bad habit of anthropocentrism in favour of becoming posthuman,” (Hauptmann and Radman 2014, 7). Guattari himself may not take this so far – rather than abandoning the semiotic register entirely, he would argue that we decenter signifying semiotics in relation to other semiological and non-semiological processes. This still has the effect of shaking off anthropocentrism, which matters because the posthuman approach allows us to see the human as only one scale of an assemblage. Seen in this way, we can escape the overcoding of language in order to think about processes that can sense without discursive categorization. Understanding signs in this way opens up an experimental and aesthetic-ethical approach to existence: "A-signifying signs do not represent or refer to an already constituted dominant reality. Rather, they simulate and pre-produce a reality that is not yet there. Existence is not

already a given, it is a stake in the experimental assemblages, be they scientific, political or artistic,” (*ibid*). Guattari ([1986] 2008) gives the example of generating diagrammatic interactions, such as algorithms, that work directly with the realities to which they refer without passing through discursive categorization. This means that based on an ontology grounded in a Simondonian conception of information, Deleuze and Guattari have opened up new strata for ways of both thinking through the possibility of meta-stability, but also creating new lines of flight in ways that go beyond the limited structuralist regime of signifying language. We move toward the posthuman and its potential for experimentation with new subjectivities.

Cognitive Assemblages

Where biosemiotics was limited to the living organism only, Guattari’s mixed semiotics offers the possibility of adding postsignifying technology and media into the communication assemblage of the posthuman. Developing a framework for theorizing the role that technology plays in shaping the way we think has been at the core of much of N. Katherine Hayles’ work since the publication of *How We Became Posthuman* (1999). In *My Mother Was a Computer* (2005) and *Electronic Literature* (2008), Hayles uses the concept of *intermediation* to describe the way that bodies, texts, and other media interact: “Because making, storing, and transmitting imply technological functions, this mode of categorization insures that the different versions of the posthuman will be understood, in Kittlerian fashion, as effects of media” (Hayles 2005). From such a perspective, signification is no longer able

to adequately account for the role that code plays in digital technologies. Further, Hayles begins to see herself as a “distributed cognitive system composed of multiples agents that are running the programs from which consciousness emerges,” (2005, 213) at the same time that she acknowledges the possibility of intelligent, thinking machines.

In *How We Think* (Hayles 2012), this view evolves into the more nuanced approach of technogenesis, which argues that we “think through, with and alongside media,” (1) and that humans have co-evolved with technics. Starting from the premise that the tools we use alter the way our brain functions at a neurological level, Hayles, like Stiegler ([1994] 1998), argues that our interactions with digital media (which are embodied) have physical bodily effects. Understanding cognition as embodied in this way facilitates a broader application of the term *thinking*, which can even include objects that have sensors and act on the perceptions received through these sensors. Hayles, drawing on the work of Jakob von Uexkül, argues that such objects have an *umwelt*, or inner world, a further point of connection with biosemiotics, which attributes *umwelt* to non-human biological organisms. However, it is Hayles’ extension of *umwelt* to technical, non-biological objects that paves the way for expanding the source of cognition into both nonconscious and unconscious action.

All of these parts coalesce in what Hayles (2016a, 2016b) calls cognitive assemblages. This framework is important because it emphasizes the possibility for distributed cognition — or the cognitive nonconscious — as a capacity that extends far beyond consciousness. Hayles adopts the language of assemblage from Deleuze and Guattari over that of the network in large part because of its ability to facilitate various scales, as we

saw in the previous chapter. For Hayles, the larger systemic scale is where the most important implications arrive. In other words, when computers and systems can be widely connected with one another and with biological organisms, the capacity for cognition is expanded in meaningful ways.

Cognition is here defined as “*a process that interprets information within contexts that connect it with meaning,*” (Hayles 2016a, 792, emphasis original). Importantly for Hayles, the process of interpretation implies a choice, which, in addition to human choice, can include selecting a binary 1 or 0 or nested conditional statements in programming languages. As we saw previously, biosemiotics links this mechanism of choice to the creation of subjectivity (Kull 2011). In much the same way as biosemiotics, Hayles sees choice – both human and nonhuman – as a way to insert meaning back into Shannon’s model of information transmission. Meaning is created through the context of the choice that is made in the process of interpretation. However, Hayles, unlike biosemioticians, extends this ability for choice beyond the biological through her inclusion of technical systems. This extension also opens a possibility of moving beyond the human/nonhuman (or even living/nonliving) distinction that has remained part of much of posthuman theory. Instead, she argues, we might use a cognizers/noncognizers distinction, though even this is not able to fully capture the variety of interactions that occur at a material level between a variety of entities:

To express more adequately the complexities and pervasiveness of these interactions, we should resist formulations that reify borders and create airtight categories. The better formulation, in my view, is not a binary at all but interpretation, continual and

pervasive interactions that flow through, within, and beyond the humans, nonhumans, cognizers, noncognizers, and material processes that make up our world. (Hayles 2016a, 801)

Following these flows offers Hayles a way of understanding distributed ethical responsibility from a consequentialist perspective that evaluates the results of the choices through information interpretation. Although this framework seems well-suited to such an approach, I am more interested developing the idea of the cognitive assemblage through an experimental Spinozist-inspired nomadic ethics that asks what a body can do.

The concept of cognitive assemblage bridges the gap between biosemiotics and Guattari's mixed semiotics by adding the technical to the biological assemblage and theorizing the communication of the postsignifying regime through an expanded notion of cognition. However, I argue that diving deeper into the notion of the assemblage, particularly as it is conceptualized through a Guattarian machine, offers a better opportunity to follow continual and pervasive interactions while avoiding the reification of borders that Hayles warns against. In more fully exploring Guattari's machinic regime, it will be possible to construct an artmachine that facilitates an experimental and creative ethical approach to processes of subjectivation.

The Machinic Regime

By better understanding the role of in-formation in the process of *agencement*, one can more clearly follow continual and pervasive interactions. Tracing these movements

provides more opportunities for understanding how to experiment with this process and its related process of subjectivation. Such experimentation involves risk precisely because we do not know ahead of time what a body can do; we may create new resonances that are favorable and extend and expand our abilities, but we may equally create experiments that are unfavorable and make it harder for us to act. I argue that when we are able to understand the process of in-formation, we are better prepared to grasp and intervene in a kairotic moment with a new experimentation that can generate new lines of flight and processes of subjectivation. As I will explore in detail below, it is the postsignifying aesthetic paradigm of the artmachine that is best suited to the process of invention that generates these lines of flight. This follows Guattari's ([1989] 2008) call to abandon scientific regimes for aesthetic ones, primarily because science attempts to explain while looking backward, but art attempts to experiment by looking forward. Further, postsignifying enunciation is the primary field through which art can battle empire, drawing upon concepts such as contagion and pathic transference (Guattari 2015). Finally, it is technics that determines the problematic field for invention, which links closely to Foucault's conceptualization of technique/techne/technology and an insistence of media specificity.

To draw these various elements together and understand the importance of technics to postsignifying aesthetics and its role in the machinic regime, we must begin by understanding what the machine is and how it operates. For Guattari, machines are not technical entities, but rather the conceptual operators of assemblages that, "define the conditions of possibility of technical works... explaining how cultures modulate the biological, the sociopolitical and the

material in their assemblages,” (Sauvagnargues 2016, 186). Guattari ([1992] 2006) explores the components of the machine most thoroughly in *Chaosmosis*, outlining six main components that concern individuation and processes of subjectivation:

- Material and energy components;
- Semiotic, diagrammatic and algorithmic components (plans, formulae, equations and calculations which lead to the fabrication of the machine);
- Components of organs, influx and humours of the human body;
- Individual and collective mental representations and information;
- Investments of desiring machines producing a subjectivity adjacent to these components;
- Abstract machines installing themselves transversally to the machine levels previously considered (material, cognitive, affective and social). (34-35, formatting corrected)

Let us consider each of these in turn, considering how they might fit in with the broader informational ontology that has been developed.

The focus on materiality in the first component aligns well with the larger aim of this project to develop a material and embodied approach to information and data. Though the machine and its processes of *agencement* can seem abstract, Guattari is clear that the process is always material in nature. The second component adds semiotics to the machine in a way that closely aligns with Hayles' conception of the cognitive nonconscious, allowing for thought that is beyond the conscious, human, or mental approaches to knowing (Hayles

2016a; Sauvagnargues 2016). This collective assemblage of enunciation is larger than the cognition of an individual, extending across various levels of assemblages and encompassing the postsignifying regime. It is through the third component that the first two come to reside in a particular metastable individual, which might be a (post)human, computer, network, or some other assemblage, understood as a body without organs and its sets of electrical, affective, and chemical flows at various speeds (Deleuze and Guattari [1972] 2009). The human body can be part of this assemblage, but is not necessarily so. These three components of the machine are responsible for the process of individuation, connecting to produce heterogeneity (Sauvagnargues 2016).

The final three components of the machine relate to processes of subjectivation. The individual and collective mental representations of the fourth component refers to the "semiotic layers of mass-mediatised information, of the industry of social and commercial order words... which must not be confused with the structure of spoken language (French or English, for example), or with a technical, formal or scholarly language," (Sauvagnargues 2016, 190). These semiotic layers are part of the larger collective assemblage of enunciation, created through the multiple and often contradictory discourses that influence the way we perceive the world. The discourse networks in which we are involved shape and may limit the way we interpret and understand the sensory information that shapes our perceptions of the world. In context of David Hume's philosophy, as explicated in Chapter 4, we can understand the creation of the subject as "an imprint, or an impression, left by principles, that it progressively turns into a machine capable of using this impression," (Deleuze [1953]

1991, 113). But the sense impressions and the machine both exist within already articulated discourses networks that thus constrain the construction of the machine. In the next section, I will explore more fully the resonances between this Guattarian approach to semiotic layers and media archaeology, Kittler's formulation of discourse networks, and Stiegler's theory of technics.

Sauvagnargues (2016) explains that it is through the fifth component, the investments of desiring machines, that particular bodies are both subjectivated by but also feed into a social machine that consists of coded flows. Importantly for Guattari, subjectivity is created adjacent to the components themselves, creating a complex relationship. Desiring machines produce a subjectivity that is adjacent to the components, but the resulting subjectivity is *also* the condition of desiring machines rather than the causal sum of them. Such a formulation means that there is a dynamic relationship between subjectivity and desiring machines, leaving open the possibility for experimentation and change. Experimentations with one's processes of subjectivation can thus also alter one's desiring machines. In other words, the choice that arises out of multiple forms of nonconscious cognition can and do transform subjectivity, at all scales of the assemblage from that of the individual to society at large. Finally, it is the abstract machine that is a diagram of the assemblage and holds together the previous five components of the machine. It is "an intensive map of relations of force that assemble... humans and materials, techniques and institutions," (Sauvagnargues 2016, 202). It is through this diagrammatic approach that experiments with processes of subjectivation are possible: "The abstract machine operates at whatever fractal level you

want and enables you—as a variable in your possibilities of analysis, of your capacities to invest reality – to produce new modes of subjectivity," (Sauvagnargues 2016, 193).

Understanding the machine in this way lets us avoid the insistence of the scientific paradigms on discovering truth and instead opens wide the aesthetic paradigm that makes clear the uncertain and always metastable state of the assemblages which surround us and also create us. For this reason, the aesthetic emphasis on experimentation is of utmost importance for generating new processes of subjectivation. Knowing the components of the machine and its diagrammatic approach to assemblage affords greater opportunity for intervention and experimentation with our own processes of subjectivation.

Media Archaeology and Discourse Networks

Before proceeding further, it is worth noting the connections between Guattari's fourth component, individual and mental representations, and the work of Foucault, Kittler, and Stiegler. In this section, I will elaborate on each of these projects and afterwards demonstrate the connection to Guattari's machinic assemblage. In his work, *Archaeology of Knowledge*, Foucault ([1969] 2002) attempts to explicitly lay out a method that was used imperfectly in his earlier works such as *Madness and Civilization* ([1965] 1988) and *The Order of Things* ([1966] 1994). He defines his archaeological method as the process of uncovering the conditions of knowledge as they take shape in discourse. Before this method, language analysis focused on which particular rules allowed statements to be

made. Foucault's description of the events of discourses asks a much different question: "how is it that one particular statement appeared rather than another?" ([1969] 2010), 30).

The emphasis in this method is on discourse itself, which entails examining statements as real and manifestly present, considering only what has been formulated, which importantly, also includes those things that have been left out as gaps in what is said (Deleuze [1986] 1988b). These are disconnected from any individual subject, or transcendental/collective consciousness. In other words, statements must be taken at face value rather than endeavoring to search for any authorial intent that might exist behind such statements. This method focuses on knowledge in that it explores the relation between discursive practice and knowledge, or *savoir*, in the original French. *Savoir*, in contrast to *connaissance*, refers to "the conditions that are necessary in a particular period for this or that type of object to be given to *connaissance* [relation of the subject to the object] and for this or that enunciation to be formulated," (translator's reference in Foucault [1969] 2002, 20; original source not given). It explores the conditions that make it possible to utter a particular statement in the first place. These conditions are the dynamic set of relations that make up the archive, which is the law of what can be said. One limitation of this method is that it is impossible to describe one's own contemporary archive precisely because of one's location within it as a limiting factor of what can be seen and said.

Foucault ([1969] 2002, 44-54) lays out three guidelines for analyzing the rules of formation of objects: (1) the surfaces of emergence, or the context in which the object is situated, (2) the authorities of delimitation, and (3) the grids of specification, or the systems

by which an object is structured and differentiated. Further, this leads to four consequences: (1) objects do not pre-exist their emergence, (2) object is defined by exterior relations with other objects in a field of exteriority, (3) relations must be distinguished by primary relations, and (4) discursive relations take place at the limit of discourse, determining the group of relations necessary to speak of any particular object.

The set of relations between a discursive formation and the sciences is called an episteme: “the total set of relations that unite, at a given period, the discursive practices that give rise to epistemological figures, sciences, and possibly formalized systems,” (Foucault [1969] 2002, 211). Foucault then considers potential wider applications of his archaeological method, moving beyond analyses of epistemes. One example he offers is how this method might be used with a painting. Rather than the more traditional focus on the meaning of a painting, an archaeological approach would try to show the discursive practices that have been embodied in the techniques and gestures of the painter.

Yet, Foucault’s analyses are limited in an important way. According to Kittler ([1985] 1990), Foucault’s analyses all focused on discourse networks that consisted of libraries. However, discourse networks consist of more than just libraries, especially beginning with what Kittler referred to as the 1900 discourse network. This is offered as one potential reason that Foucault’s own historical research did not extend past 1850. In *Gramophone, Film, Typewriter*, Kittler ([1986] 1999) points out that Foucault was not able to see that even writing itself is a technology, and in fact served as universal medium before the concept of a

medium existed¹². An important project for Kittler then, was expanding Foucault's methods into discourse networks that include other forms of media such as information networks: "Archaeologies of the present must also take into account data storage, transmission, and calculation in technical media," (Kittler [1985] 1990, 369). One major difference is that writing required all data to pass through signifiers, but newer technology can process the real directly, making use of a-signification and bypassing human interpretation. Geoffrey Winthrop-Young (2011) argues that, whereas for Foucault epistemes shifted inexplicably, Kittler demonstrates how such epistemic shifts are correlated with shifts in media by exploring the ways that power circulates through the hardware and software that makes up technical media systems, through his insistence on the presupposition of exteriority, mediality, and corporeality.

One question that remains unanswered about epistemic shifts is how we might intervene in the role that technology plays in shaping us as subjects. In *Technics and Time, 3*, Bernard Stiegler ([2001] 2011) makes concrete the degree to which technics impact our forms of knowledge and the way that we see the world through our *ēpistēmē*. The invention of analog sound recording allowed humans, for the first time ever, to experience exactly the same thing twice. For Stiegler, what this demonstrates is precisely that each experience, though it may be of the exact same audio, is really a different experience, because we bring to it new anticipations based on our having heard it before. This elucidates the way that

¹² Though Foucault did not analyze print as a technology, the enormous role of print culture in cultural, political, and economic structures has been argued by scholars such as Eisenstein (2009) and Johns (1998).

technical objects serve as a tertiary memory that consists of our heritage and background knowledge, and actually serves as the foundation for primary and secondary memory (Stiegler [1996] 2009). These technical systems create epochs, and when we transition to an epoch because of a new technical system, we likewise face a disruption that must be negotiated using the technical object itself. This notion echoes Kittler's analysis of epistemic shifts that are correlated with shifts in media. However, for Stiegler, cinematography plays a unique role in that he sees it as mimicking the way that consciousness itself works, through their similar processes of editing by joining experiences into a single flow using montage. This similarity also explains the persuasive power of cinematography. Due to the aforementioned industrialization of this tertiary memory, Stiegler argues that the process of the collective individuation of a 'We' is stifled, creating existential suffering, or malaise. Although this process itself is industrialized, Stiegler does point to it as an area for potential resistance, allowing the possibility that we might ourselves be able to determine what counts as our heritage through the process of crafting a future.

The arguments presented in these three works serve as a fundamental example of the type of work that the field of media archaeology can undertake. First, they emphasize one of the key themes of media archaeology, which seeks to understand what it means to be modern and to be in the world, with special emphasis on the media experiences of the nineteenth and early twentieth centuries (Parikka 2012). Moving beyond merely analyzing how media shape our *ēpistēmē*, Stiegler argues that technics are a fundamental ontological part of the human experience and that, in actuality, the human experience has always already been caught up in

and is inseparable from technics. This takes seriously Foucault's claim that the archive constructs what is seeable and sayable, while at the same time adding technics inextricably to the perceptual apparatus. Through an emphasis on epochs generated by specific technical objects and systems, Stiegler also offers an example of how media archaeology can examine the impact of specific media on how we understand the world, following Kittler's emphasis on a presupposition of mediality and media specificity. For example, though cinematography holds a special position because of its similarity with consciousness, cinema has also converged with digital media and is being shaped, altered, and moved beyond in ways that are important to consider. Specifically, the impact of networks as a technical epoch brings with it new challenges to the way that we understand time and memory. Of note, Parikka (2012) calls attention to the fact that often the work that emphasizes political analysis and the work that emphasizes media specificity are mutually exclusive. In the case of Stiegler's *Technics and Time* series, there is only brief mention of cognitive capitalism and how it might relate to his ontological and epistemological theory.

Stiegler's work, also drawing at times on Simondonian concepts such as individuation, gives a concrete example of how Guattari understands the role of semiotic layers in his machinic regime. What is seeable and sayable is limited because we are constructed as subjects by and through the technics that are inextricably linked to our perceptual apparatus – we are shaped within the confines of the semiotic layers in which individuate. However, whereas Stiegler notes some possibility for the crafting of our own future, Guattari identifies a radical openness to experimentation. This experimentation is also

inherently political for Guattari, as we experiment to move away from empire and capitalist regimes of subjectivation. The question remains, then, how does one create the artmachine that facilitates this experimentation?

Artmachines

It is the artmachine that facilitates experimentation with the real, of and through the technics with which we are part of an assemblage. Sauvagnargues (2016) defines the artmachine through its construction of an understanding of the image and the sign as real production rather than interpretation and language. Understood this way, art is intimately connected with semiotics due to its linkage with postsignifying signs. Production occurs as a becoming and thought is produced by an encounter with the sign: “Something in the world forces us to think. This something is an object not of recognition, but of a fundamental *encounter*,” (Deleuze [1968] 1994, 139). The sign that is encountered is also the bearer of the problem – it is the relation between thought and the sensible. The movement-image, as well as all other signs are "the modulation of the object itself," (Deleuze [1985] 1989, 27). This concept of modulation relates back to Simondon's rejection of Aristotelian hylomorphism as discussed in Chapter 6. Rejecting the hylomorphic imposition of form, information facilitates a continuous exchange between two metastable entities, drawing them into a common system or associated milieu. In this way, art inscribes the production of its sense into the material. It functions as a sign that is the bearer of a problem. How does this work?

Aristotle offered an example of the brick and its mold to explain his relationship between matter and form (Sauvagnargues 2016). In this view, the mold impresses its form upon the matter (clay) to create the brick. Simondon argues that there is actually a reciprocal assumption of form occurring between the clay and the mold:

Each molecule of the clay enters into communication with the pressure exercised by the surface of the mould, in constant communication with the geometric form concretised in the mould; the mould is as informed by the clay as the clay is by the mould, having to resist, to a certain point, the deformations of the material (the constraints it exercises on the mould). What this very simple, canonical example shows... is that at the level of technics itself, where the hylomorphic scheme appears to be triumphant, the individuation (of the brick) puts into play a ... differentiation that operates in such a way that the mould and the clay 'modulate' together, concretely interacting. (Sauvagnargues 2016, 70).

From this example, we can see the importance of modulation to Deleuze's ([1985] 1989) conception of the movement-image as modulation of the object itself. The encounter between thought and the work of art creates a sign that is modulated through problematic disparation: “In other words, art does not consist in imposing form upon matter, nor in producing a subjective effect upon sense, but in ‘following a flow matter’” (Sauvagnargues 2016, 71). Art is instead about capturing forces (Deleuze [1981] 2003). Conceived thus, art becomes indistinguishable from technics – both are forms of modulation in which “materials are

captured and assembled into matter of expression,” (Sauvagnargues 2016, 75). It is the artmachine, then, that facilitates experimentation.

This suggests both a new methodology for communication studies, which I will explore in the following chapter, as well as an approach to experimenting with new forms of subjectivity by exploring the various modulations that arise from different assemblages of technics. We can understand this process by returning to Guattari's final component of the machine – the abstract machine – and its capture of forces through a double becoming in the process of modulation, which is the creative process. Or, we might say, it is the affirmative process of construction through disparation. Simondon draws his inspiration for disparation from the psychophysiology of perception which "designates the production of depth in binocular vision and addresses the asymmetry of retinal images, an irreducible disparity that problematically produces, through the resolution of their differences, binocular vision," (Sauvagnargues 2016, 63). Disparation is creative in that it resolves the problematic of bi-dimensional images through the construction of a new tri-dimensionality of depth. Such is the affirmative and creative element of modulation. In the next section, I explore this affirmative possibility through the case of big data, seeking a different approach to assemblage that, through modulation, will generate experimental forms of subjectivation that offer the possibility of escaping the modes of control enabled by current approaches to big data and surveillance.

Big Data, Modulation, and Control Society

In the introduction to this work, I explained that I struggled with the conflict related to big data that existed in the two different worlds in which I worked: e-commerce and critical theory. While one approach relied heavily on using big data to generate greater profits, the other was critical not only of these uses, but of the larger surveillance mechanisms that big data enable. Similar to this conflict I faced, Yuk Hui (2015) points to a conflict in the work of Deleuze, identifying an *aporia* created through Deleuze's use of the term modulation. Modulation, as I explored above, is a concept that is leveraged throughout Deleuze's work to overcome hylomorphism. This allows one to think in terms of reciprocal effects rather than molding. Modulation is related to the process of in-formation that enables the shift from a philosophy of static being and form to a philosophy of becoming and dynamic change. Yet, in "Postscript on Control Societies," originally written in 1990, modulation becomes for Deleuze "the paradigm of capitalistic production, or more precisely, the operation of power in control societies," (Hui 2015, 77). Though Deleuze was writing before the explosive use of big data, instead using money as his primary example, his views on control society can be easily extended and applied to the role that big data plays today, as he stakes the emergence of control society to the digital:

The various forms of control, on the other hand, are inseparable variations, forming a system of varying geometry whose language is *digital* (though not necessarily binary). Confinements are *molds*, different moldings, while controls are *modulation*, like a self-transmuting molding continually changing from one moment to the next, or

like a sieve whose mesh varies from one point to another. (Deleuze [1990] 1995, 178, emphasis original).

Modulation permits the control of control society. And further: "In disciplinary societies you were always starting all over again (as you went from school to barracks, from barracks to factory), while in control societies you never finish anything—business, training, and military service being coexisting metastable states of a single modulation, a sort of universal transmutation," (179). In this work, modulation is the disindividuating force that creates Deleuze's *dividuals*, a concept that has been applied to the way the targeted marketing facilitated by big data operates.

An important path forward for affirmative uses of big data will entail reconciling this problematic role of modulation in Deleuze's concept of control society. Hui (2015) suggests that this use of modulation as control is only one possible outcome from the larger philosophic concept of modulation as used by Deleuze, but even more appropriately as used by Simondon, who applied the concept more directly to technology than did Deleuze. Modulation and control has been theorized since Deleuze's essay only through the cybernetic goal of maximum efficiency, but this is only one way to theorize modulation. The task, Hui argues, is to supersede social control by "inventing new forms of modulation that are not limited to them or by them," (88). For example, Hui suggests a type of modulation as reconstruction of the social, and cites a 2012 alternative social networking site he helped construct with Bernard Stielger and Harry Halpin. Drawing on Simondon's notion of collective individuation, it imagines a group rather than individual-based social network. My

project also develops a new approach to modulation. This is done in light of my development of an informational ontology through an expanded reading of Deleuzian and Simondonian ontologies, in conjunction with Guattarian machinic regimes read through the lens of Hayles' cognitive assemblages. In the next section, I explore how these approaches offer a new type of modulation that is not limited to the uses of control society.

Data as Material Trace

The conceptual relationship between information and data is one of confusion that varies in a sometimes-contradictory manner between differing fields. However, I argue that an understanding of this relationship based on an informational ontology with a connection to Guattari's postsignifying semiotics and cognitive assemblages, combined with research on digital traces, can define the concept of data in a way that will be widely productive. The first step is to conceptualize data as a digital trace in order to emphasize the material and embodied nature of our digital interactions. Tyler Reigeluth (2014) begins to explore what such a shift might look like by explaining that: "Reframing the subject in relational terms [via a Simondonian informational ontology] means considering her in a co-constitutive process of becoming with her environment. It is this problem, this margin of indeterminacy and becoming, which is materialized in our traces" (252). These traces are the records of our assemblage with an interface, and might include concrete things like what one has searched for on Google, as well as what would otherwise be called metadata, such as where and when the search took place. In *Anti-Oedipus*, Deleuze and Guattari ([1972] 2009) explain that

every connection or cut made by desiring-production gives rise to a sign, which is an inscription of the event of that encounter. What is new about digital media is the range of events that can be recorded and the existence of a single unified medium for all such traces.

The next step requires linking this concept of the trace to a-signifying/postsignifying semiotics. Langlois' (2011) discussion of meaning serves as an important conceptual bridge for this link: "a-signifying semiotics involves the harnessing of material intensities and the deployment of a system of signs to intervene in the production of reality. In doing so, a-signifying semiotics are not primarily concerned with meaning as the content of signification, but with the adequation of a communicative ensemble with the real," (21). A trace is a postsignifying discursive-material record of one's informational interaction with the real. Although such traces can later be appropriated, mined, and algorithmically analyzed, the key difference between this understanding and that of data is the emphasis on the material connection to postsignifying semiotics. The discursive and material dimensions of the trace are inherently intertwined: the content is recorded materially but can then be algorithmically processed as a postsignifying material. Conceptualizing our digital interactions as traces rather than the traditional data that is suggested by the supposedly immaterial nature of cybernetic information opens up new avenues for thinking about the composition of relational databases, as well as the composition of assemblages, and creates the opportunity for creative approaches to modulation and subjectivation.

In order to elaborate on this opportunity for creative approaches, it will be necessary to contrast this approach further with traditional data approaches. The predominant

contemporary understanding of big data is well represented by Alex Pentland's (2014) work on social physics. Pentland aims to use the related technologies of big data, persuasive technology, and the Internet of Things as a way to command and control actions that promote positive or "useful" social norms through engaging incentives. Simon Mills (2015) argues that Pentland's approach is ultimately cybernetic in nature because it relies on probabilistic measurements of information flows. Mills contends that if we understand big data from a Simondonian perspective—and, I would add, as a trace—there will always be a level of indeterminacy that allows further individuation due to its connection to an external environment (assemblage). In other words, Pentland's examples for big data presume a closed system. In a closed system, every outcome could be determined. However, the universe at large is an open system, and this openness means there is a radical indeterminacy that can never fully be calculated algorithmically no matter how much data is collected. As we will see, Parisi's (2013) insight on the nature of information pushes this line of thought even further, showing that this indeterminacy comes not just from what is external to the system big data is trying to analyze, but is inherent in the computational aspect of big data itself.

By acknowledging and embracing the indeterminacy of the open universe in which we exist, we not only deny the ability of big data to predict unexpected phenomena, but also utilize big data, relational databases, and algorithms as part of our own cognitive assemblages in order to experiment with creating new trans-individuals. Mills (2015) demonstrates that the probabilistic ontology of cybernetic information underlying Pentland's

work with big data represents a weak emergence of unexpected phenomena from a lower level. The weak emergence framework supports the view that it is possible to predict such emergence if only one has enough data. In contrast, informational ontology adheres to a strong emergence, which supports the view that it is *not* possible to predict such phenomena, even in principle, because they are ontologically novel. In attempting to think about big data through this approach, the questions will shift away from those related to regulating through control and command to those that are oriented toward aesthetic experimentation in the production of new trans-individual assemblages and their distributed cognition, which include, for example, relational databases and algorithms. Such work connects closely to Hayles' (2016b) cognitive assemblages. Our material digital traces, existing in relational databases, offer opportunities to create new assemblages that use these traces as part of their larger cognitive processes, creating a modulation between ourselves and the database. As Hayles (2016b, 55) suggests, in designing technical cognitive systems, we also design ourselves.

Mark Hansen's (2015) work on *Feed-Forward* offers one such approach to what this modulation might look like. While Hansen's work draws on a non-Deleuzian interpretation of Alfred North Whitehead and draws on a phenomenology that remains quite human-centered, its connection to process philosophy and emphasis on big data as an inherently open system means that there is significant resonance with this current informational ontology project. Although it is beyond the scope of this current project to compare and contrast Hansen's approach using Whitehead to my own approach to informational ontology

through Deleuze and Simondon, I believe there is enough similarity that his example of modulation makes sense in this context. Of course, as Hansen himself notes, we can never collect enough data to predict novel occurrences in the world, but it is possible that computational databases will be able “sense” such emergences faster than human senses could. For example, if we look to the sky, we may not predict it is going to rain until we start to see clouds forming. However, drawing on a larger array of geographic weather patterns, historical data, and other sensors, a larger cognitive assemblage could likely predict an upcoming rain shower before the local formation of such clouds.

For Deleuze, the importance of cinema was that it provided a way to theorize *thinking* in images as an appearance that displaces action with sensory affection, avoiding the necessity of having to translate that thought through language and discourse (Deleuze [1983] 1986; [1985] 1989; Sauvagnargues 2016). This conceptualization makes clear the role of postsignifying semiotics to thought. Big data, specifically in conjunction with the Internet of Things and its many sensors, now provides a way to theorize *cognition* that is not only pre-discursive, but also pre-affective (through additional sensors that are able to sense in the realm outside of our affective awareness), drawing on data that exists entirely outside the realm of human awareness, such as brain wave activity or current air quality (Hansen 2015). This makes clear the role that postsignifying semiotics, which may be entirely outside of the realm of human awareness, can have on distributed human/technical cognition. It also opens up the ability to feed-forward these cognitions that can exist at different scales. For example, sensors might actively register the current composition of our microbiome at one scale, or the

relative health of a city based on air quality, temperature, and other variables at another scale. By monitoring our gut microbes, for example, sensors that are part of a larger cognitive assemblage may be able to alert us about the possibility of an illness before we were ever able to sense it ourselves, offering the possibility of intervening before we actually become sick.

These data can then be fed-forward into the scale of human perception to guide future-oriented action. Hansen (2015) explains this as a situation where "data about our behavior is 'artificially' made available to a just-to-come future moment of consciousness *before it will have bubbled up, as it were 'naturally,' into consciousness*. In this way, we acquire the capacity to access sensibility literally *before we can perceive it,*" (198, emphasis original). Further we must embrace this as a way to help shape our own future experiences, both because its uses are inevitable and because it can be beneficial to us. Importantly, even such an expanded cognitive assemblage can not actually predict future action in the way Pentland has suggested, as I will discuss further in the next section. What this feed-forward framework can offer is a way to increase the possibility for experimentation using a more broadly constructed cognitive assemblage that can facilitate clearer understanding of both the micro and macro levels of our own assemblages – a more ecological perspective than otherwise available. It also facilitates a modulation that can escape the framework of the control society that Deleuze explicated.

Inherent Unknowability

While such an approach to modulation offers one possible escape from Deleuze's concerns about the control society, there is a more fundamental ontological escape from the system of complete control and surveillance that exists because of the inherent randomness in all data. Gregory Chaitin (1999) develops his theory of the inherent randomness of mathematics by beginning with David Hilbert and his pioneering of the field of metamathematics in an attempt to eliminate all doubts about the efficacy and power of mathematics. However, this process ultimately failed, instead revealing the fundamental uncertainty that underlies mathematics. The result of this failure, though, played a large role in the development of the modern computer and other related technologies.

The importance of this failure is also connected the larger history of mathematics. Bertrand Russell's set theory paradoxes led to the development of symbolic logic, which via the work of Gödel and Turing, showed that it is impossible to formalize mathematics, and further that "essentially **any** formal axiomatic system is either inconsistent or incomplete," (Chaitin 1999, 11, emphasis original). Chaitin, from an early age, became intrigued in these problems and wanted to determine if they were unusual or if they impacted all of math: "I began to suspect that perhaps sometimes the reason that mathematics can't figure out what's going on is because **nothing** is going on, because there is no structure, there is no mathematical pattern to be discovered. Randomness is where reason stops, it's a statement that things are accidental, meaningless, unpredictable, and happen for no reason," (Chaitin 1999, 22, emphasis original). Chaitin uses the programming language LISP to create proofs for both the Incompleteness Theorem and the Halting Problem, before developing his own

proof related to algorithmic information theory based on randomness: “Roughly speaking, a random string is incompressible, there is no simple theory for it, its program-size complexity is as large as possible for bit strings having that length,” (Chaitin 1999, 86). The inability to compress the string demonstrates its unpredictability. In terms of big data, this means that not only can it not predict novel occurrences because it is connected to a larger open system, but even within a closed system, data itself inherently contains a randomness to it, generating the potential for unpredictable novelty even within *closed* systems.

This uncompressibility, Chaitin argues, is even stronger than Turing’s proof because it goes beyond saying something cannot be computed, and shows that it cannot be *proven*. The incompleteness of formal systems owing to their inevitable unpredictability also neatly parallels quantum physics, and, as he would later demonstrate in *Proving Darwin* (2012), biology: “According to metabiology the purpose of life is creativity, it is not preserving one’s genes. Nothing survives, everything is in flux, *ta panta rhei*, everything flows, all is change, as in Heraclitus,” (Chaitin 2012, 79). This emphasis on flux and flow echoes many of the elements of both biosemiotics and informational ontology more broadly, especially with its emphasis on creativity.

In addition to the implications of randomness inherent in reality itself, this added conceptualization also has concrete impacts on the way we understand data surveillance. To make this connection, we will need to understand how Chaitin’s work can be linked directly to limits of current algorithmic processes. In *Contagion Architecture*, Luciana Parisi (2013) uses Chaitin’s algorithmic information theory to argue that change and potential are inherent

in all computational logic because it is "infected" with incomputable quantities. This insight opposes the way that both first and second-order cybernetics have conceived of algorithms, because they have not been able to include the probability of incomputability that is present *within* computation rather than in opposition to computation. In contrast to this, Parisi believes that we can understand algorithmic objects as generating an original mode of thought:

Chaitin's pioneering information theory explains how software programs can include randomness from the start, and indicates that they do not have to be limited to fixed sets of algorithms or to a closed formal axiomatic system. Thus the incompleteness of axiomatic methods does not define the endpoint of computation and its inability to engage with dynamical change, but rather its starting point, from which new axioms, codes, and algorithms become actual spatiotemporalities. Algorithmic architecture, it is argued here, can be conceived precisely as the programming of infinitely random data possessed of volume, depth, and length, which thus come to define actual spatiotemporalities of data. (19)

This understanding of algorithms seems to align well with informational ontology where "information processing is now unfolding of individuation as floating upon inexhaustible potentiality, not the encoding aspects of computation restricted by statistical rules of probability," (Faucher 2013, 202). Information from an informational ontology perspective is firmly rooted in an open system that generates novelty through its resolution of the tension between dispartes. Understood in this way, "indeterminacy does not have to be located at

the level of the already individuated information-as-message but can be found at a more fundamental ontological level,” (Mills 2015, 48). Like this ontological understanding of information, algorithms cannot be limited to closed systems, meaning that they are also open to this inexhaustible potentiality.

Acknowledging the randomness inherent in algorithms leads to several practical consequences. First, this allows us to escape the oppressive acts of data surveillance because pure potentiality exists as an inherent part of the system itself. The predictive power of big data relies on *predictability*. Predictive ability increases as more data is available about a particular system. However, all data is inherently characterized by an element of randomness. This means that even in systems designed and used exclusively for data surveillance, an element of randomness exists that, even were the system closed, can always generate novelty that is not predictable, no matter how much data has been collected. To take a somewhat uncomplex example, a system designed to predict where a person will be at any of moment of the day may get it wrong sometimes because of the randomness inherent in data and not because it just did not have enough information. Just as important, understanding this element of randomness can help us design and deploy algorithms that embrace this element of randomness to increase our potential lines of flight through our assemblages with technology. Additionally, Parisi suggests this acknowledgment offers a new way path for creating algorithms that are both open-ended and able to accommodate the contingent and random nature of reality. She describes these forms of algorithms as building immanent modes of non-anthropocentric thought and experience that will impact computing devices but

also be incorporated into architecture—the main topic of her book, *Contagion Architecture*. Algorithmic objects constructed in this manner would more fully open themselves up to aesthetic potentialities rather than neoliberal control.

In the next chapter I will draw upon the work in the previous chapters to suggest the possibility of a new posthuman approach to media studies. Such an approach, building off the posthuman ontology, ethics, and aesthetics developed so far, will lend itself to new methodologies. Because this approach rejects the cybernetic mathematical model of communication as transmission, it instead uses modulation as a founding principle of communication.

CHAPTER 8: Ontological Disobedience: Toward Posthuman Media Studies

“For ontological disobedience there is no end. Rather, there is a constant injunction to be disturbing and challenging. This also begins to account for an important difference between the instrumentality of many forms of political radicalism and the open ended-ness of dynamic disobedience. Ontological disobedience is far more radical than mere political disobedience.” – Steve Woolgar 2005

I began this project by examining the current problem-space of information and big data, concluding that big data is predominantly conceived of from within the resource doctrine of information. Further, I have argued that the ethical approaches and frameworks traditionally leveraged to manage information, such as notice and consent and anonymization, no longer make sense due to the rise of big data. Based on a genealogy of the concepts related to information and technics, I developed a material, embodied approach to information in which it is understood as a process that drives becoming and, importantly, can be linked to questions of meaning through its construction of cognitive assemblages.

This material approach to information draws on the ontologies of Gilles Deleuze and Gilbert Simondon, combining Simondon’s concept of information with Deleuze’s concept of the dark precursor. Information in this system becomes a dynamic process that replaces the static form of being that is present in hylomorphic systems ranging from Aristotle to cybernetics. Understood as such, the model of molding gives way to the model of

modulation, in which entities that are in-formation are simultaneously affecting one another in a mutual process. This concept of information gives an ontological undergirding that explains the process of assemblage (*agencement*) as well as recent microbiome research that problematizes the notion of the individual. Informational ontology eliminates the notion of the individual in favor of metastable entities that are in flux and always open to further individuation.

One major consequence of this approach is that it opens the door to studying assemblages at varying scales of composition. From this perspective, the so-called human is one small, non-essential way of understanding a particular assemblage. A posthuman media studies approach encourages us to study scales both smaller (such as the microbiome) and larger (such as communities, cities, or planets) and provides a framework for doing so. I suggest that a model based on citizen science offers an important methodology for studying larger scale assemblages, because it can allow us to understand the processes of subjectivation that occur at these larger scales. Connecting this approach to a-signifying semiotics is particularly important, because this approach provides a framework of thinking not only about the construction of larger cognitive assemblages, but how those assemblages are constructed and how we can intervene in our own processes of subjectivation created within and through these assemblages. When big data is understood as a material trace of interactions with the real, it can also be seen as a-signifying and offers similar opportunities for experimentation, particularly in the role it might play as part of a larger cognitive assemblage that can help feed-forward the future into our present awareness.

While art, science, and philosophy all provide revolutionary potential, Guattari elevates the importance of art in generating experimental approaches to processes of subjectivation. I demonstrated how an understanding of machinic assemblages can help one better create artmachines that facilitate such experimentation. Because art and technics can both be conceptualized as a form of modulation, technics can serve an important role in the creation of such experimental artmachines. While this approach connects closely with previous work on media archaeology and discourse networks, the emphasis on affirmative experimentation also extends these methods in important ways.

This way of thinking about information has larger implications for methodological approaches in the field of communication, and this chapter highlights such approaches. Other communication scholars drawing on the work of Gilbert Simondon, such as Andrew Iliadis (2013b) and Sarah Choukah and Philippe Theophanidis (2016), have also seen the potential for a Simondonian approach to information to suggest alternative methods for studying communication. For example, Iliadis suggests that Simondon's contributions offer a metatheoretical positionality from which the field of communication can comprehensively address the multimodality of information, communication, and technology. Choukah and Theophanidis propose a framework for studying communication through ontogenetic emergence, which allows the conceptualization of communication without an agent. Having developed the framework for a broader informational ontology in the preceding chapters, I argue that we can now see the broad outlines of what this new approach to communication might look like, while demonstrating important methodologies associated with such an

approach. In this concluding chapter, I undertake an initial exploration of what these methodologies are, how they connect to an informational ontology, and how they might be used to study communication.

Based on an exploration of technogenesis, N. Katherine Hayles (2012) called for the development of comparative media studies that involves close, hyper-, and machine reading. Working through the implications of her suggestions for a material, embodied approach to information in *How We Became Posthuman* (1999) and combining this approach with Rosi Braidotti's emphasis on an affirmative politics, I believe there is potential for a much larger shift within the field of communication. This is an approach I refer to as posthuman media studies. This approach is posthuman in that develops an informational ontology that is ecological in nature, encompassing a view in which humans are only one possible scale of analysis and insisting on the necessity of broadening such analyses to scales both larger and smaller. In doing so, media, and technics much more broadly defined, become one part of such an assemblage.

This perspective resonates with several of the latest approaches in the sciences, including problematizations of the concept of the individual that have emerged from studying the microbiome as well as questions of meaning arising from biosemiotics (see Chapter 6). However, posthuman media studies also insists on the primary importance of media within this approach, emphasizing its role in affirmative approaches to becoming that resolve tensions between disparates and generate opportunities to critically and creatively intervene in one's own processes of subjectivation at multiple scales. Understood in this way, “the

conditions of a true critique and a true creation are the same: the destruction of an image of thought which presupposes itself and the genesis of the act of thinking within thought itself,” (Deleuze [1968] 1994, 139). This affirmative approach seeks to generate the act of thinking within thought itself by developing creative methods that afford the opportunity to intervene in processes of subjectivation.

Modulation

Modulation for Simondon is the reciprocal assumption of form between two interacting elements. This emphasizes that the process of interaction is always occurring in both directions at once, over throwing Aristotle’s hylomorphic model of one-way molding. Modulation offers an affirmative and creative approach to becoming, in which entities are created through their mutual interaction. Perhaps the most significant shift I am proposing for communication and media studies is the potential for thinking about communications without the need of positing pre-existing agents that transmit messages to one another. Such an approach would offer a significant alternative to what has been a widely shared and studied model for communication. Such a shift has been suggested by Illiadis (2013b) and expanded using the concept of emergence by Choukah and Theophanidis (2016). While I have previously explored the concept of modulation through its potential for creating an *artmachine* as a method of intervention, this intervention inherently requires a form of analysis, which could be used for studying processes of communication without necessarily also attempting to generate such interventions.

Such an approach begins with understanding that Simondon defines communication as: “the fact that low-energy incidences can establish couplings, amplifying effects occurring between different orders of magnitude in the same metastable system or between different metastable systems” (Simondon 2010, 60; as quoted and translated by Choukah and Theophanidis 2016, 294). At its core, communication is the establishing of couplings and connections (Deleuze & Guattari ([1972] 2009) which can then cause unexpected and magnified results. Communication understood in this way aligns well with a posthuman media studies because it does not require any discourse, though this may *also* be part of the communication process. Chuokah and Theophanidis leverage this definition to apply the concept of emergence because they see such a process creating the agents involved in the communication as well as the reality shared by those agents. In other words, the agents did not exist independently before communication established their couplings: “Framed in such a way, emergence has to do with the causation of novelty at the level of the whole, but in a way that cannot be explained by, or reduced to, the pre-existing components or parts,” (Chuokah and Theophanidis 2016, 288). This approach has the immediate effect of broadening communication studies to include a vastly wider array of couplings, in which communication can take place outside of the linguistic realm of humans, including non-human and non-conscious metastable individuals that emerge as part of the process of communication. Once there is metastability and autopoiesis, the molar wholes (individuals) can also *act back on* the connections, guiding them in specific ways (Deleuze & Guattari

([1972] 2009). Insect swarms (Parikka 2010), herds of buffalo, and single cell organisms all offer interesting potential areas of research using a modulation/emergence framework.

Scholars focused on more traditionally human communication can also find potentially useful ways to leverage such a framework as well. Iliadis (2013b) offers several suggestions for this approach:

For example, whether we are talking about empirical evidence in doctor-patient health communication or the analysis of vast quantities of data in social network analysis, an individuating methodology would seek to measure, uncover or understand those communicative structures that modulate in the act of communication and that perpetuate by virtue of an individuating flexibility. What variable characteristics of the formal “consultation” setting are responsible for trends that develop in interpersonal communication? How do reflective properties inherent in the visibility of a wiki edit history potentially alter future edits? (17-18)

Another way to understand the social element of this is by tracing the amplifying effects of modulation. Simondon (2010) offers three approaches to amplification which are important for understanding his use of the concept modulation: (1) transductive amplification, which can be seen in his example of crystallization, (2) modular amplification, seen in his example of a triode, which works by adding a control grid that amplifies the energy emitted by a diode and (3) an organizational, or auto-regulating amplification (*l'amplification organisatrice*) that combines modulative amplification with transductive amplification and is demonstrated through the example of the creation of binocular vision from the previous chapter. These

forms of amplification can also be understood through socially equivalent examples such as (1) crowd effects (crowd-sourcing or -funding), (2) marketing and (3) the self-regulation of neighborhoods (Hui 2015). Understanding the role of amplification in modulation and individuation can offer an alternative perspective to how communication occurs, especially in the way that a small input can trigger a much greater reaction.

Of all the Deleuze/Simondon approaches to communication, the concept of modulation has thus far been one of the most under-theorized approaches, though it perhaps also offers the greatest transformational potential. This is especially true in the context of thinking through alternative approaches to modulation that operate outside of control society, as discussed in the previous chapter. This section demonstrates a few potential approaches to using modulation for such research in the hopes of pointing to ways that this concept can be leveraged for future work within a posthuman media studies framework.

Counter-Memory

Counter-memory as a method connects closely with the informational ontology's insistence on the non-unitary nature of an individual. Counter-memory is one of the practices which we can employ in order begin to understand our own non-unitary and non-essential self. It helps us see that we could have been otherwise and understand that through becoming we can still be otherwise in the future. In this section, I will show how counter-memory connects to this larger ontological framework and give an example of how it might help us

not only understand our own non-unitary nature but also analyze current technologically-infused political debates about social networking.

A methodological approach to counter-memory emphasizes both recording and making accessible the voices, narratives, and knowledges that are typically left out of the official histories constructed through dominant modes of power relations. Counter-memory involves both the affirmative process of embracing our own non-essential nature or disunity – realizing our current assemblage is but one possible configuration—as well as developing the ability to listen to the silence as a way of constructing counter-histories. The first step to developing a methodological approach of counter-memory is recognizing the role that it plays within processes of subjectivation by creating a gap of difference:

Counter-memory in a sense liberates us from a particular mode of subjectivity in that we come to recognize the positionality and nonessentiality of a particular way of being. Through counter-memory, we disinvest ourselves for the power that a particular constellation of meanings once held over us. By means of genealogical accounts of that constellation, we distance ourselves from its authority. (Clifford 2001, 133)

A subject is itself genealogical, and by recognizing that genealogy can create a gap of difference that allows for new modes of subjectivation.

This counter-memory approach is also linked closely to Deleuze's ([1968] 1990b) distinction between the times of *aiôn* and *chronos*.¹³ *Chronos* is the linear, recorded time of the molar majority-subject, which uses memory to attempt to hold on to a fixed identity and reduces 'others' to an a-signifying role (Braidotti 2002, 2006). Trauma is an event that can dislodge a subject from the dominant reality of shared reference points and move them toward *aiôn*, a molecular, cyclical, and discontinuous time. This molecular view draws on minoritarian memory, or counter-memory that resists the assimilation into dominant ways of representation, disconnects a subject from a fixed identity, and begins processes of becoming through new subjectivations (Braidotti 2006, 2011b). The counter-memory of becoming minor frees time from the authority of the past. Foucault points out that we scream about how repressed we are and witness this repression through a pornography of suffering, but for Guattari the past suffering only matters if it continues into the present (Braidotti 2014). Instead, we can keep in mind this suffering only so that it can assist in the creation of a virtual future that develops a potential that was there (counter-memory) but did not make it. However, this process of becoming minor is neither easy nor painless. The process of dislodging from the linear time line of the molar majority-subject and its fixed identity is traumatic. Becomings test our limits and require that we take breaks as we mark our thresholds. Even when intentionally undertaken, such a process is traumatic – perhaps more so if one is thrust into the *aiôn* without their intention. For example, the subjugated

¹³ John Sellars has questioned whether Stoics really understood time in the way that Deleuze argues. See his *Aiôn and Chronos: Deleuze and the Stoic Theory of Time. Collapse 3* (2007), 177-205.

knowledges of counter-memories are often relegated to the silence of history, but they can also produce insurrections that disrupt official histories and mainstream perspectives (Foucault 2003; Medina 2011). The disruption of these perspectives is itself traumatic because there is an associated loss of bearings. We move out of the anchored linearity of *chronos* into the unmoored *aiôn*.

These counter-memories can also occur at the larger scale of collective becomings, constructing a counter-history that opposes the unity of the political body. Like counter-memory for the subject, a counter-history also produces a disunity of the political body. Through a counter-history, law can come “to be seen as a Janus-faced reality: the triumph of some means the submission of others,” (Foucault [1997] 2003, 70). Medina extends this: “what was officially presented as past glorious victories that legitimized monarchs and feudal lords as the rightful owners of land to whom taxes were owed, now appeared as unfair defeats at the hands of abusive conquerors who became oppressors and had to be overthrown,” ([2008] 2011, 14). It is genealogies, explored in further detail below, that facilitate the insurrections of subjugated knowledges.

Posthuman media studies can highlight the role that technologies play in this process and suggest alternative assemblages. In the wake of Donald Trump’s 2016 election as U.S. president, much has been written about the role of media in the election. These stories range from the role that Facebook played in the promotion of fake news to the backfiring of a media literacy education movement that caused people to question every source (boyd 2017). Some critics have worried that the celebrated democratic potential of the Internet has itself

backfired, instead creating disparate groups living within filter bubbles that they are unable to escape. Yet, seen another way, the 2016-2017 political climate in the U.S. can be read as a media-centric story of a counter-history insurrection and the resulting backlash of the trauma to majority-subjects. My approach will explain how Barack Obama's presidency, along with the rise of the internet, enabled the large-scale spread of disruptive counter-memories and subjugated knowledges. These disruptions caused trauma to many citizens in the United States, who, in voting for Donald Trump as president, were hoping to "Make America Great Again" by restoring their pre-disruption epistemic ignorance.

First we need to understand the relationship between majority memory as epistemological ignorance and minority counter-memories. We can begin an approach to this through Charles Mills' (1997) concept of white ignorance in *The Racial Contract*. Medina (2011) explains Mills' argument as follows:

Mills argued there that privileged white subjects have become unable to understand the world that they themselves have created; and he called attention to the cognitive dysfunctions and pathologies inscribed in the white world, not merely as side-effects, but as constitutive features of the white epistemic economy, which resolves around epistemic exclusions and a carefully cultivated racial blindness... but this racial self-ignorance also produces blindness with respect to racial others and their experiences.

(31)

Black counter-memories are subjugated knowledges and offer the potential for insurrections. Similarly, we can expand this framework to include other minority-subjects such as women

and those who are LGBTQ. A privileged majority-subject can be epistemically ignorant to these minority experiences if not confronted by them (Simoneaux 2016).

During Barack Obama's two terms as the first African-American president of the United States, the percent of the world population who use the internet doubled, growing from 22% to 50% ("Internet Growth Statistics" 2017). Obama's terms as president saw the increased sharing of counter-memories via the Internet, and, in particular, social networking. It also witnessed counter-history insurrections that drove notable changes in attitudes and laws surrounding minorities in the U.S., including the legalization of gay marriage and increased acceptance and understanding of transgender people. Though this has been framed in popular media as a case of progressive elite snowflake coastal-Americans pitted against ignorant/racist/xenophobic flyover middle-Americans, this narrative cannot fully account for the disparate world views of these two groups. It is these divergent world views that have fueled a spiraling debate over what counts as fake news. Instead, the counter-history insurrection fueled by the growth of the Internet and the minority presidency of Barack Obama can be understood as causing trauma to majority-subject Americans as they were dislodged from their linear experience of time as *chronos* and forced to see, even if only as a glimpse, the way past glorious victories were actually unfair defeats. The dislodging caused by this glimpse is painful and traumatic, particularly because it was not sought out by the majority-subjects.

Donald Trump's campaign slogan calling to "Make America Great Again!" can now be understood as a retreat from the trauma inflicted by a counter-history insurrection and a

desire to return to epistemic ignorance. This need for epistemic ignorance is so great that it becomes possible to label anything that disagrees with one's former majority-subject position as "fake news." This is perhaps a moment that requires significant reflection from those working within the minority-subject counter-history insurrection of subjugated knowledges, so as to avoid two potential pitfalls:

Once we have excavated our genealogical fragments, once we begin to exploit them and to put in circulation these elements of knowledge that we have been trying to dig out of the sand, isn't there a danger that they will be recoded, recolonized by these unitary discourses which, having first disqualified them and having them ignored them when they reappeared, may now be ready to reannex them and include them in their own discourses and their own power-knowledge? And if we try to protect the fragments we have dug up, don't we run the risk of building, with our own hands, a unitary discourse? (Foucault [1997] 2003, 11)

The minority-subject insurrections run the risk of being used to either create new subjugations or disempowered and included in the previous subjugations. One immediate conclusion that results from this understanding is that other perspectives should not be silenced (Medina 2006, 2011). For example, rather than preventing senior Breitbart editor Milo Yiannopoulos from speaking on college campuses during his 2016-2017 tour, protestors may have been better served by working to highlight counter-histories and counter-narratives. This allows the existence of epistemic friction which maintains insurrections of

subjugated knowledges rather than allowing them to develop into new subjugations or be included in previous ones.

How does one proceed in the context of epistemic friction? This requires seeing processes of becoming as collective and intersubjective, intervening through the use of imagination:

Shifting away from the reassuring platitudes of the past to the openings hinted at by the future perfect: this is the tense of a virtual sense of potential. Memories need the imagination to empower the actualization of virtual possibilities in the subject. They allow the subject to differ from oneself as much as possible while remaining faithful to oneself, or in other words: enduring. (Braidotti 2006, 169).

Affirmative forces can be actualized through the imagining of a better future. Rather than dwelling in the past (the pornography of the suffering or the anger over the ignorance), we must construct a new vision for a collective becoming. Some scholars have argued that the filter bubbles created and maintained by social networking sites and search engines are responsible for the divisive political climate in the U.S. leading up to and extending through the election of Donald Trump. In this case, it is the technology itself that is blameworthy, and many are seeking technological solutions. I contend that instead, it is the trauma caused by counter-histories that has created the divisive political climate. Understood in this way, there is no technological tweaking of what gets displayed by algorithms that can solve this divide. Instead, it will be important confront and maintain the counter-histories and counter-narratives of subjugated knowledges as a way to move through and beyond the trauma

caused by becoming-minor. Acknowledging this, we can perhaps take a first step toward creating an *artmachine* that harnesses affirmative forces to resolve the tensions between two disparate epistemologies.

Media Genealogy

We have seen how counter-memory serves as a form genealogy, but a posthuman media studies approach could also focus this genealogical approach. A media genealogy approach was called for in a 2016 Special Section of the *International Journal of Communication* in which I participated. In the introduction to the special issue, Monea and Packer (2016) suggest that a media genealogy approach would add politics to media archaeology. This approach is explored through interviews with six scholars who presented at the April 2015 annual Communication, Rhetoric, and Digital Media (CRDM) Symposium at North Carolina State University. Monea and Packer argue that media archaeology has been limited to the application of practices seen in Foucault's early works, whereas a genealogical approach would embrace the approach he began to use in his lectures from the Collège de France in 1970. As I explored in detail in earlier chapters, this work emphasizes the importance of processes of subjectivation in ways that his earlier work did not. Though they do not put it in such terms, Monea and Packer suggest an approach that is quite similar to understanding the machinic regimes of assemblages: "Any analysis of technology requires an examination of the discourse through which that technology has been produced as an object of knowledge for thought. We have to understand the infrastructure of which it is a part if we

want an accurate technical articulation of the object itself” (3153). This involves studying the larger context of the technology as well as the histories of which it is a part.

Monea and Packer (2016) demonstrate the ways that the work of the CRDM Symposium presenters aligned with this approach. Paul Edwards (Monea and Edwards 2016) links tools and our understanding of them through discourse while Peter Gaillison (with Lorraine Daston) (Packer and Gallison 2016) explores how processes of subjectivation are intertwined with processes of observation and data collection in the sciences. Chris Russill (Maddalena and Russill 2016) demonstrated the way that media allowed the depletion of the o-zone to be seen as a hole rather than some percent decrease. These examples include scholars who would not identify themselves as media genealogists, but nonetheless have resonances with such an approach. Monea and Packer (2016) also emphasize that this approach is:

not meant to discourage scholars from continuing to perform archaeological investigations of media and technologies. Instead, we have tried to demonstrate how that methodological commitment leads outside of itself, that at some point it requires a genealogical component, which, when added, lends media studies a relevance and urgency it might not otherwise have. We are also of the opinion that opening media archaeology up to genealogical commitments—notably power and subjectivation—allows media studies to better interface with hugely significant and often overlapping investigations from other disciplines of media, science, governance, and technology. (3165)

Media genealogy thus clearly elevates the importance of subjectivation in a way that resonates with the posthuman media studies I am advocating. However, by extending this methodology into posthumanism, the potential for ethical interventions into processes of subjectivation emerges particularly through a-signifying processes. This is especially important for a medium like big data, for which traditional critical and cultural approaches have been able to offer little beyond critique. Despite this difference, media genealogy and posthuman media studies are more alike than dissimilar.

Critical Making as Ontological Disobedience

Critical making offers a methodological approach well suited with the theoretical underpinnings of posthuman media studies because it not only emphasizes a type of embodied making that recognizes the importance of materiality and a-signifying flows, but it also offers a conception of craft as *tekhnē* that aligns well with Deleuze and Guattari. Matt Ratto coined the term critical making between the years 2009 and 2011, and discussion continues over what exactly can or should be included under such an umbrella. One prominent point of concern surrounds the questions of whether the products of critical making should eventually be displayed, perhaps in a manner similar to art projects, or whether such a display would detract from the emphasis on the low-pressure process of making (Ratto and Hertz 2015). Though these debates are valuable, the most important aspect of critical making in its link with a posthuman media studies is its original theoretical underpinning.

Matt Ratto, in developing both this concept and method, aimed to bring together two types of work that have recently been understood as quite separate: “critical making is an elision of two typically disconnected modes of engagement with the world - ‘critical thinking’ often considered as abstract, explicit, linguistically based, internal and cognitively individualistic; and ‘making,’ typically understood as material, tacit, embodied, external and community oriented,” (Ratto and Hockema 2009). In further explaining this separation, Ratto notes that critical thinking is almost always understood linguistically, while making often tends to be interpreted as a form of rule-following such as putting together a piece of IKEA furniture (Ratto and Hertz 2015). Therefore, juxtaposing these terms creates some cognitive dissonance. From an informational ontology perspective, it is a method that emphasizes non-linguistic a-signifying approaches to scholarship because it allows for a process of making that avoids the over coding of the linguistic strata. This is a material and embodied approach with an emphasis on creativity.

The materiality of making also serves an important role for Ratto (2011) in this process: “My goal is to make concepts more apprehensible, to bring them in ways to the body, not only the brain, and to leverage student and researchers’ personal experiences to make new connections between the lived space of the body and the conceptual space of scholarly knowledge.” (254). This material emphasis also demonstrates clearly what Deleuze meant when he linked true critique with true creation. Ratto sees a similar connection: “One insight I have had is that the practices and modes of engagement that are typically called ‘critical’ and those that are equated with creativity and innovation are quite similar,” (Ratto

2011, 259). When making is the approach one takes to critique, it can be nothing else but creation. Such an approach offers an important shift in a landscape where social scientists most often critique and analyze without being involved in the process of creation (Powell 2012).

The process is also clearly one of modulation, in which the creator and the world help form one another: “There needed to be an engagement within the process of critical making where the material substrate that you were working with helped determine the final form of whatever you were making. In other words, that the world pushed back on your own thoughts of what the world could be. So it couldn’t be a purely imaginative or, as Tim Ingold puts it, a purely hylomorphic practice,” (Ratto and Hertz 2015). At first blush, this seems to contrast with the emphasis on imagination that we saw from Braidotti above. However, for Braidotti, these imaginative forces must still be based in the present while drawing energy from the future. In other words, the imaginings must take into account the current arrangement of the world, and is within that arrangement that we can interject our imagination in order to make changes for the future. Ratto emphasizes the need to step back and realize someone made the things in the world around you, and that the choices they made are affecting you, as a way of seeing that all of these choices are political. From there, Ratto hopes that critical making opens up a sense of agency for participation in the this newly apprehended world of politics.

It is precisely this affective nature that leads Hertz (2015) to argue for the importance of also displaying the resulting objects: “critical objects can hit like an emotional sledgehammer.” Clearly both the process and the result can be important. For the maker, the

process of making is itself transformative, as understood through modulation. The process of making as modulation transforms both entities involved in the process, both the human maker and the object being made. This is true whether or not there is a resulting project that is displayed. However, a resulting object might also be an *artmachine*, with the potential to create an affective impact that intervenes in the processes of subjectivation of others. Having my students use critical making as a method while teaching my course, *Posthuman Media Studies*, I have been able to clearly observe the importance of both sides of this process. For example, one group explored the theoretical concepts related to a-signifying semiotics and assemblage theory in the process of creating a papier mâché globe that, thanks to microcontrollers, screamed at varying levels of intensity depending on where it was touched. The level of intensity was determined by the air quality of the location.

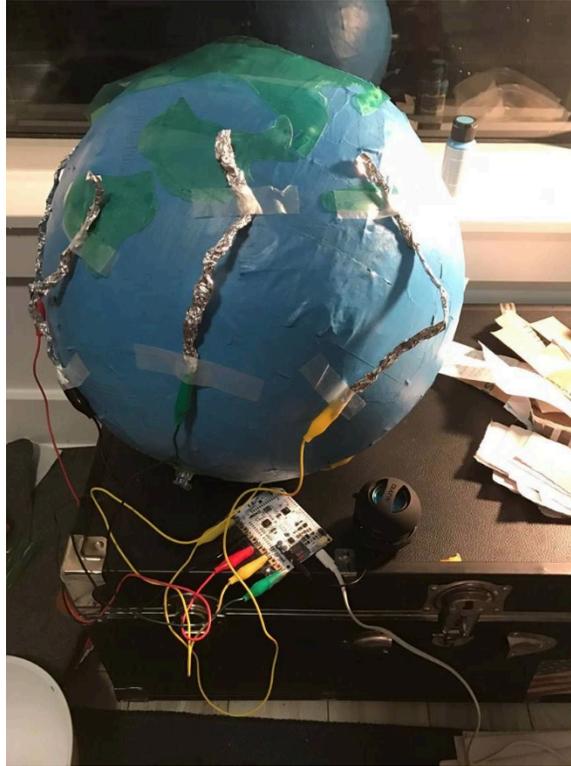


Figure 10. Screaming Globe

While the makers of the globe were learning about and understanding and critiquing the possibilities of a-signifying semiotics while also developing an approach to a process of subjectivation at the scale of the entire globe, those who experience the product of the making have a quite different experience. While reading about pollution and its unequal distribution across the globe certainly impacts many readers, hearing the screams of the globe, louder in some places than others, has a larger affective impact and perhaps offers a different way of understanding pollution from a different scale.

Connecting to Open Source and Citizen Science

Connecting critical making practices to other movements, in particular the open-source and citizen-science movements, expands posthuman methodological possibilities even further. Csikszentmihalyi (2012) argues that the free software movement offers the best model for the making movement because it allows teenagers in Zambia or Mississippi to benefit from the same production environment as professionals and be part of the development. As a teenager who grew up in Mississippi myself, I can certainly attest to the importance that free and open source software played in my own development, but also, notably, in my own processes of subjectivation. Coming of age alongside the Internet, available software at that time was more likely than not to be free. Being part of this milieu, I understood and participated in modes of connection and work that were not articulated closely to capitalist regimes of power. Despite significant changes to the Internet and a much greater emphasis on capitalist modes of exchange, my own subjectivation was shaped greatly by earlier participation in free and open software movements. Of course, calling something “open source” does not automatically make it thoughtful or critical, and there is always room for failure as well (Galloway and Hertz 2015; Powell 2012). However, this failure is itself a part of the process. In learning by doing, a valuable part of the learning is precisely learning what does *not* work.

The other important aspect of the free software and open source movement for Csikszentmihalyi (2012) is the platform it offers for collaboration, sharing, development, and distribution. Combined with critical making and citizen science, the collaborative nature of

the open source movement can be extended further into the realm of hardware and experiments. Dieter and Lovink (2012) argue that our conception of the maker must move beyond the myth of the individual and embrace the positive contribution of the many. Capitalist modes of individuation elevate the individual human and emphasize the importance of responsibility for oneself, but making is always political and when expanded to the many offers a mode of collective individuation that can escape capitalist capture (Csikszentmihalyi 2012; Dean 2016; Dieter and Lovink 2012). Pushing this idea even further, one might create non-capitalist approaches to business, such as Matthew Manos' (2012) provocation to disregard business as a money-making venture and instead conceive of it as another medium – a critical enterprise. In this model a business is itself used as a way to experiment, learn, and disseminate knowledge. This is a possibility for private companies that do not have an obligation to shareholders to increase profits.

Citizen science offers a model of participation on which to base such experiments. For example, distributed environmental sensing projects connect data and hardware hacking (Kera 2012). But these projects also create an illusion that collecting and crunching data is all that's needed to be a good citizen. Instead of being an endpoint, such experiments should be understood as entry point in which one can better understand how science and data work in relations to their associated tools and measurements: “The messiness and materiality behind data, issues with calibration, precision, complex conditions surrounding every experiment are better lessons for amateurs and enthusiasts to master before they can understand, participate and assess science,” (Kera 2012). Elaborating on this model, I argued in Chapter 6 that these

methods can be extended past the realm of science proper in order to help us understand our communities, cities, and homes as subjects in themselves, making clear the points at which critical and creative intervention is possible.

Extended in such a way, we can understand this process through the lens of what Steven Woolier calls ontological disobedience. In the context of citizen science, Kera describes this as "perpetual rebellion against social and other conventions in the name of probing their conditions, limits and possibilities, which are often technical and economic," allowing us to "test different configurations and relations between people, molecules, traditions, tools and norms, and we reach consensus by experimenting with people, data and hardware at the same time" (Kera 2012). Such ontological disobedience becomes a method for experimenting with new arrangements of assemblages at all different scales, working to understand what a body can do. This experimentation can be achieved through deconstructing current systems and introducing unexpected novelty.

One path to this disobedience comes through the subversion of current network assemblages by demonstrating the what-could-have-been or what-might-be. Brucker-Cohen (2012) offers some guiding principles for this approach within the limited context of networks. He offers the following methods derived from his own projects:

1. Emphasize multiple methods of connectivity by creating a hand crank that controls the bandwidth speed.

2. Challenge factors of network interaction by allowing a third party to control a wireless network, emphasizing the friction between public spaces and corporate ownership of wireless networks.
3. Amplify metaphors by making the results of copy/paste actions globally accessible rather than restricted to the local machine.
4. Alter the rules by creating a maximum number of subscribers for a mailing list and unsubscribing existing members when new users join.

Such approaches can be extended well beyond networks to media, technologies, and larger assemblages of all types. This results in a shift wherein we see ourselves as active makers of our experiences and not "just consumers of the objects and systems [we] interact with on a daily basis; to feel [we] have the capacity and right to tinker with the designed dimensions of [our] worlds," (Clapp et al 2017, 126). This is a shift away from black boxes and capitalist regimes to new forms of subjectivity. A posthuman media studies approach insists that we understand how such changes alter our processes of subjectivation.

Conclusions

I have sought to develop an approach to posthuman media studies that avoids reducing information to a resource, an approach that conceptualizes information as a material, embodied process, producing data as material traces of that process. This conceptualization of information, particularly when combined with Guattari's a-signifying semiotics, places primary importance on processes of subjectivation in a way that

understands subjects as assemblages, from the micro to the macro level, and sometimes with distributed cognitive abilities. Understanding the role of technology in such assemblages becomes a priority for understanding the subject. When conceived in this way, several under-theorized ways of approaching media studies stand out, including modulation, counter-memory, media genealogy, and critical making, particularly when combined with citizen science. These methods, combined with an emphasis on subjectivation, highlight a Spinozist ethics of experimentation, the creation of *a* life – always indefinite (Deleuze [1995] 2001). *A* life is therefore nomadic at the ontological level. It is a constant throwing of the dice as we rearrange our own assemblages, recognizing that we are constantly *in-formation* as different connections are actualized at all scales. While we can study and critique current media practices, the more important imperative is to experiment with new practices and arrangements.

Future work might take a variety of different approaches. Methodological approaches such as communication through the framework of modulation can be extended and most importantly applied through to new examples that help demonstrate the benefit of this framework. Similarly, counter-memory analyses offer a wide potential for application. One important route might consider how big data as material trace can be developed into an archive that is able to not only preserve and store counter-memories, but develop a better platform through which to promote such subjugated knowledges in ways that help drive the process of becoming-minor.

I argue that most importantly, a posthuman media studies approach should embrace experimental *activity*. Understood in the context of in-formation, how can we create new assemblages that include experimental arrangements of techniques, technologies, and technics. In particular, how can we think *technē* at scales above and below the human? This activist and interventionist approach requires constant experimentation, drawing inspiration from the future that can be injected into the present. In order to escape the capture of the logics of capitalism, particularly in the form of control and surveillance, such efforts should be nonprofit and open source when possible. All the while, we must remember that the results of such experiments can never be known in advance. Some will succeed and others will fail. But we must create new *artmachines* that offer experimental approaches to subjectivation as a way of destroying the human face. For posthuman media studies, then, this nomadic ethics is the sustained practice of ontological disobedience.

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