Politics for the Neurocentric Age

A Dissertation submitted to the Graduate Division of the University of
Hawaiʻi at Mānoa in partial fulfillment of the requirements for the
degree of

Doctor of Philosophy
in
Political Science

June 2011

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Dedication

To Franklin, Judy, Betty, and Ruth

Acknowledgements

Thinking is a product of a mental ecology, and the thought contained in this dissertation has been greatly improved by my good fortune of living in environments filled with smart, creative, critical, and encouraging individuals. In classrooms, meeting rooms, waiting rooms, beaches and bars, many friends, family members, and colleagues contributed vital pieces to this project. I would like to express my sincere gratitude to these individuals.

I'd like to thank my committee members, who were a consistent source of creative inspiration and support. In classes and office visits, Mike Shapiro taught me how to use political theory as a catalyst to create and connect concepts. He demonstrated how to ignore unnecessary disciplinary boundaries to draw insights from diverse forms of knowledge, wherever they may be found. Danielle Conway challenged me to think about the core purposes of intellectual property law, and never let me settle for a clichéd argument. Neal Milner helped me understand what "rights" actually do in the world, not what they are supposed to do, essential for thinking about the future of rights. When a non-scientist wades into the water of science, it can be dangerous. Martin Rayner kept me well protected and pushed me to be a fearless explorer in the ocean of neuroscience.

My colleagues at the Institute for the Future were incredibly supportive at critical junctions of the process. Many ideas were nurtured to maturity, or mercifully euthanized, within the friendly confines of our Palo Alto offices. In particular, I'd like to thank Mathias Crawford, Lyn Jeffery, and Kathi Vian for reading and responding to chapter drafts.

Abstract

Advanced brain imaging, neuromodulation technologies, and new insights into cognition have opened up the mind to new political involvements. Modes of political power are expanding their reach inside the human brain. At the same time the mind is offloading more of its functions into the technological and social artifacts of our environment, introducing new forces of control into the cognitive ecology. These transformations are ushering in the *neurocentric age.*

Life in the neurocentric age is going to be different. It will generate unexpected social and political relations, as well as unprecedented policy and ethical dilemmas. A politics *of* the neurocentric age will involve the emergence of a new power-knowledge, and the reconsolidation and deployment of old powers around new technological affordances. A politics *for* the neurocentric age must be built on a systemic understanding of these new technologies, dynamics of power, and new terrains of political contestation.

Where are the spaces of action and the stakes involved when the brain becomes a central political object? What dynamics emerge where and when the mind encounters power? What governmentalities will define these new

political terrains? This dissertation examines the rise of neuroscience as the

dominant way of knowing our world and ourselves, and traces the shifts in

the administration of emergent neuropowers within the domains of political

subjectivity, surveillance, intellectual property law, and governance design.

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Chapter 1: Introduction: A Politics for the Neurocentric Age

The Dream of a *Pax-Neurona*

"I have addicted myself to the opening of heads," confessed Thomas Willis, the 17th Century father of neurology, referring to his somewhat macabre passion for dissecting human brains. Following Aristotle and Galen,[1] medicine prior to Willis viewed the brain as essentially a homeostatic organ, keeping the body's heat, animal spirits, and vital humors efficiently moderated. Philosopher Henry More, in his scoffing dismissal of the brain, described it as nothing more than a "bowl of curds." The seat of the soul and all that is human, for most natural philosophers of the time, was placed in the heart and liver. Willis and his colleagues in the Invisible College[2] corrected this view, showing that it is indeed the brain that enables the mind.

Since the "discovery" of the brain as the house of consciousness and the organ that enables the mind, its centrality in philosophical and political discourse has been secured. In this chapter, I begin by looking at the rise of neuroscience as a way of knowing and the way the brain has become a key site of political and social contestation. Next, I lay out the theoretical foundations of neuropolitics, and the characteristics of neuropower that are driving this political re-orientation. Then I look at some implications and applications of neuropolitics in a world of accelerating change and fluid identities. And I end with a vision for an exuberant neuropolitics—a democratized and participatory experiment in how we experience the world and order our societies.

While the fine details of the relationship between brain and mind remain at issue in the scientific community, the goal of this paper is not to weigh in

directly on these debates. I do, however, need to define the terms as I will be using them. The brain is the biological organ that sits in our heads. It is the organ that processes perception, sensation, attention and thought. It houses our conscious minds. The mind, though enabled by the brain, extends beyond the cranium and is part of a cognitive and emotional ecology that includes the body, the world, and the technologies we use to think, remember, and do things. The mind is embodied thought, and is a part of a process of how our brain-body-world system constructs an identity, a will, and a self.

While philosophers, such as Rene Descartes, were recognizing that the mind makes us human, historian of science Carl Zimmer argues that it was Thomas Willis, with his meticulous observation and explanation of neurological functioning, who ushered in the *Neurocentric Age*: an era "in which the brain is central not only to the body but to our conception of ourselves" (2004a, 4). This is no minor revolution, and the study of the brain from its very inception raised existential crises about human identity and human destiny. From the start, critics of Willis decried his "mad itch for innovation," predicting that his theories would "end in the ruin of the human race" (Zimmer, 2004a, 151). We see these fears about the loss of autonomy, identity, and free will recurring throughout the historical (and contemporary) discourses around modifying the brain (Dennett 2003; Fukuyama 2002; Greenfield 2003; Hayles 1999, 2003; Norretranders 1996; Wells 1893, 1898).[3] These discourses drive the politics that emerge from advances in the brain sciences.

Indeed, the original motivation to uncover the secrets of the brain was political. It was a science nurtured by men and women scarred by revolution and civil war who "hoped that a new conception of the brain would bring order and tranquility to the world" (Zimmer 2004a, 6-7). But order and tranquility do not mean equality. In fact, much of Willis' work and the knowledge that emerged from the earliest studies of the brain were directed toward maintaining hierarchical social orders by lending the legitimacy of

scientific objectivity to established power relations. Newly demonstrable differences in mental function were correlated to status differences between nobles and brutes. In other words, certain individuals or classes of individuals were destined to rule or destined to follow—to be thinkers or to be workers—based on inherent qualities of their biological brains, which could now be claimed to be reliably and objectively known. Willis aimed to "raise this prejudice to a medical fact" (Zimmer, 2004b, 43-44).

One of the truisms of the history of science is that knowledge and technologies generated for a certain purpose often exceed, transform, or even undermine the original intention of the creator(s). Neuroscience and neurotechnologies are no different. Even though Willis intended his research to maintain and reproduce certain social relations—to create a *pax-neurona*—neuroscience has led to a complete re-evaluation of our given assumptions about who we are and how we order life. Our "mad itch" to uncover the secrets of the brain is and will continue to be epistemologically and politically disruptive. One of the most important stories of the 21st century will be the tale of what happens when Willis' addiction to the "opening of heads" is shared by an entire civilization. How will life, social order and power be transformed in the service of this addiction?

Considering the enormous leaps in our technologies for viewing the brain, the advances in our scientific understanding of cognition and neural functioning, and the massive amounts of resources being directed toward the brain sciences, we have now truly entered a Neurocentric Age.

From Enclosure to Disclosure

As early as the political writings of John Locke, an avid student at Willis' Oxford lectures on the brain, the mind that had been revealed by the first

neuroscientists was rendered politically invisible—consigned to be hidden in plain sight. In Locke's work, and the political systems designed on his thinking, the mind was cast as the inalienable foundation for our humanity and the fundamental "given" of political participation and qualification. If humans were the political animal, as Aristotle argued, then politics was enabled by the rationality and cognitive abilities of people with qualified brains. In other words, politics was for people in their "right minds."

In the three centuries after Willis, neuroscience progressed relatively slowly as the brain and its functions were left safely enclosed inside the cranium. Phrenology, crude psychopharmaceuticals, and other pseudo-scientific technologies abounded. Scientific knowledge of the brain was only tangentially used and abused in service of political disputes regarding the mental capacities of women, lower social classes, or racial minorities to participate in public life. Neuroscience also played a small, supporting role for medical psychiatry in regards to public health concerns over insanity and mental illness (in which case the individual *and* his or her brain were moved to another enclosure—the insane asylum). This kind of life governance and calibrating governmentality is what Foucault called biopower.

Biopower was the dominant form of knowledge-power during the industrial age. It was associated with a governmentality of discipline. This discipline regulated "life" by forcing bodies into a series of enclosures: schools, barracks, factories, and clinics. For the first time, states were concerned with public health and extensive medical and psychological surveillance networks were implemented to generate, mold and regulate "productive bodies." New categories of sexual, psychological, and social deviance were created, and new pathologies were defined and enumerated for those who could not self-regulate within the boundaries of population discipline. Biopower reigned for most of the 19th and 20th centuries, but in the post-industrial era, a new kind of knowledge-power has been evolving.

The brain sciences have exploded just as philosophical, biological, cultural, and political boundaries are being redrawn to accommodate the movement of information through networks, and as we learn to program and re-program the virtual and physical structures around us. In just a few generations, we have moved from modern societies of discipline, in which power is concerned with moving individual through a series of enclosures, to postmodern societies of control, in which power acts on individuals through a system of continuous and free-floating modulation.

In these societies of control, we see a "crisis of enclosures" (Deleuze 1990). Bounded spaces such as schools, banks, hospitals, courts, and factories are all in transformation, with services being unbounded, fragmented, and reassembled.[4] The cranial enclosure is no different these days. Brain imaging technologies are enabling the conscious (and unconscious) mind to be "read." That is, the brain is able to communicate meaningfully without the traditional means of exchange with the world, such as spoken words, bodily gestures, facial expressions, written text, etc.

Oxygenation, blood flow, heat fluctuations, electrical signatures, and chemical reactions are being rendered intelligible via imaging tools like functional magnetic resonance imaging (fMRI), functional near infrared spectroscopy (fNIRS), electroencephalography (EEG), optogenetic neuromodulation, and other direct brain-computer interfaces (Estep 2010). The previously unseen products of our brains and minds—thoughts, memories, sensations, emotions—can now be viewed and "objectively" measured (and managed) with increasing precision and control. The brain now *dis*closes much more information than it ever did before. An army of neuroscientists are riding and fueling a wave of excitement about the power and potential application of these new tools and new information (Rosvall and Bergstrom 2010).

With new brain-computer interface and neuromodulation technologies, "programming the mind" is moving from the realm of metaphor—as we might have once used the phrase to indicate a kind of focused training—into a literal practice that blends brain, body, and computational machinery. There are now dozens of research labs not only investigating, but building, workable mind-machine interfaces that can translate neurological functioning, including thought, into machine-readable and executable information.

And this communication is going both ways: information is also being written *into* the brain (McGilvray 2010). The latest Ansari X-Prize calls for a new generation of brain-computer interfaces that will "reward nothing less than a team that provides vision to the blind, new bodies to disabled people, and perhaps even a geographical 'sixth sense' akin to a GPS iPhone app in the brain" (Orca 2010). The Sony Corporation has patented a device concept that would ostensibly direct ultrasound at certain parts of the brain to create sensory experiences in the user (Hogan and Fox 2005).

While still mostly experimental and of limited application, these tools to gaze into the brain, manipulate the mind (both invasively and non-invasively), and translate thought directly into digital code, will change how we communicate and create new avenues for mental surveillance, self-modulation, and control. They will create new dilemmas and new roles for those in power. They will be part of the evolution of governmentality—the mindset that determines the rules and responsibilities of government—that sees the continuous surveillance, regulation, and modulation of the mind as its responsibility and duty.

But what makes the attention to this political struggle even more urgent is that we don't need to wait until a future in which neuroenhancing chemicals or brain-scanning machines in airports are part of everyday life. The

governance of thought, cognitive enhancement, neurodiversity, and the re-mapping of mental spaces is happening now, as the transformative power of neuroscience has already woven itself into the fabric of our cognitive environments, into mind-body-world relations, and indeed, into the fabric of our imaginations.

Neurocentrism

New governmentalities enable and are enabled by knowledge-powers. In the last 10 years, we've seen an unprecedented convergence of scientific research around the neuro and cognitive sciences. A recent analysis of the scientific publications finds:

> the biggest structural change in scientific citation patterns over the past decade: the transformation of neuroscience from interdisciplinary specialty to a mature and stand-alone discipline, comparable to physics or chemistry, economics or law, molecular biology or medicine (Rosvall and Bergstrom 2010).
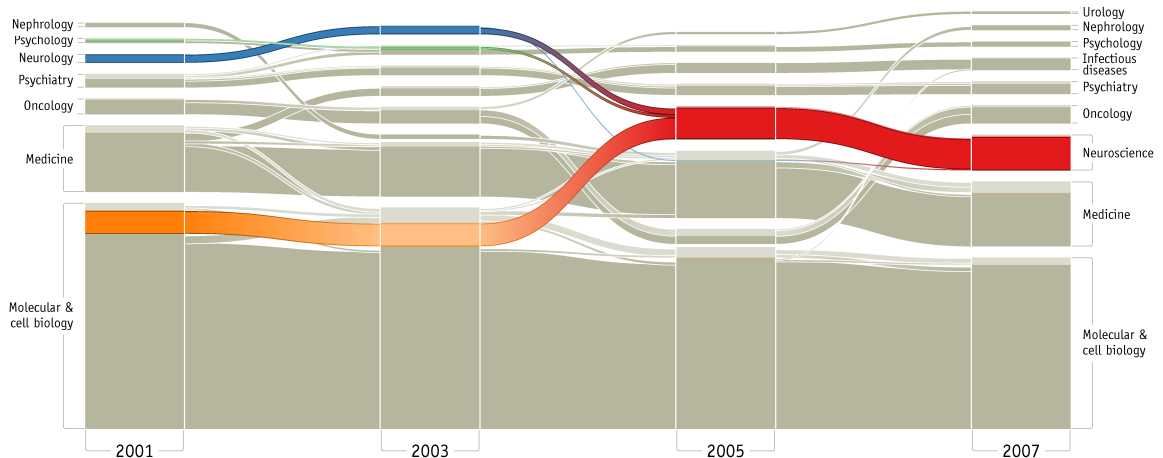
FIGURE 1: MAPPING CHANGE IN LARGE NETWORKS (ROSVALL AND BERGSTROM 2010)

The impact of this neurocentric turn is being felt in other disciplines, and new approaches to epistemology, research methods, and long-standing philosophical dilemmas are being generated and debated (Churchland 2002; Connolly 2002; Edelman 2006). When we look to the brain as the explanatory touchstone for diverse questions and disciplines, we are already witnessing neuro- becoming the *prefix du jour*, with the requisite *neurologisms* (Dunagan 2004).[5]

Tying neuroscience directly to global market forces, a movement they deem "neurocapitalism," Marxist critics Ewa Hess and Hennric Jokelt recognize the rising influence of neuroscience and its:

> usurpatory tendency to become not only the humanities of
> science, but the leading science of the twenty-first century. The
> legitimacy, impetus and promise of this claim derive from the
> maxim that all human behaviour is determined by the laws
> governing neuronal activity and the way it is organised in the
> brain (Hess and Jokelt 2009).

Although the complexity of the biology has reduced the fervor around each new discovery, we still see legions of geneticists looking for the "gene for obesity," the "gene for aggression," or the "gene for" all sorts of human behaviors and characteristics. As neuroscience and neuro-imaging take their place in the pantheon of explanatory models, we will see a new generation of discoveries of the "neural correlates" of obesity, of aggression, and all sorts of human behaviors and characteristics. The challenge for neuroscientists and neuroethicists is to create a nuanced and layered view of developments to temper the hype of neuroscience, and to contextualize its rise within larger psycho-social processes, shifting political-economies, and mythologies surrounding the brain and mind (Farah 2010, Illes 2009).

Psychologists have begun to observe the phenomena of legitimacy surrounding the "seductive allure of neuroscience explanations" in popular media today. According to a 2008 study of the legitimizing effects of neuroscience, written arguments or editorials accompanied by clinical images of the brain (even if the image was completely irrelevant to the argument), had a significant effect on the judgment of non-experts about the believability and power of that argument. The research concluded that arguments accompanied by brain images were, on average, judged to be much more trustworthy than those without such images (Weisberg, Keil, et al. 2008). The lesson from this research is clear, in the broader neurocentric world, whether one is espousing a theory of global politics or giving instructions on the correct way to fry an egg, adding a brain scan image will add veracity and power to almost any claim.

These observations about neuroscience in the popular imagination and in the construction of truth are not meant to be dismissive of the work of those in the brain sciences. Brain science has already provided transformative insights into human behavior, and will undoubtedly lead to new treatments and interventions to help millions with conditions that are untreatable today. The main point here is that we should be wary of naively falling into a "magic bullet" mentality that sees neuroscience and neurotechnologies as the answer to the personal and social challenges in front of us, whether they involve health care, the law, or even selling more soup. Neuroscientists and those who leverage insights from the brain sciences must be aware of the power they are unleashing into the world. The goal of this dissertation is to widen the scope of neuropolitics as a way of interrogating the world, but also to question the priorities and values that drive brain and mind research and their potential applications in the future.

Neurocentrism is concentrating theoretical, scientific, and financial attention inside the head, but politics for the neurocentric age requires us to think

about more than just the brain. Most neuroethicists and critical observers of neuroscience tend to be more concerned about the potential disruptions, invasions, and abuses of neural implants, brain-computer interfaces, and mind altering drugs than they do to the dynamics of power emerging in the extended cognitive environment. Direct brain-to-computer interfaces are not the only technologies that are re-drawing the lines of inside and outside, public and private, mind and world.

People are living more of their lives through digital social networks—sharing intimate thoughts, feelings, and memories with others in the parallel universe of digital and physical existence. Besides the *dis*closure of a previously conceived enclosure, the mind is networking out further and further and using digital technologies, communications media, and mobile devices as extended cognitive partners. As N. Katherine Hayles, a literary theorist who has studied the history of cybernetics, observes, networked cognitive scaffolding is leading to what she calls posthuman agency. This highly fragmented and distributed form of agency multiplies "the sites at which cognizing can take place [and] also multiplies the entities who can count as agents" (2001, 147). These extended cognitive sites and distributed agency will become the battlegrounds of neuropolitics in practice.

Constructing Neuropolitics

Neuropolitics is an approach that allows us to re-imagine culture, power, and political subjectivity in the light of our increasing understanding of the brain and extended mind.[6] Johns Hopkins political theorist William Connolly defines neuropolitics as "the politics through which cultural life mixes into the composition of brain-body processes. And vice-versa" (2002). His seminal work in this area traces the complex encounters between the physical processes of the mind and the interactions it has in the phenomenal

world. He shows how thinking is highly layered and beyond the sliver we experience with our conscious minds, but yet it is also not beyond some measure of governance and intentional modification, both through internal contemplative techniques like meditation, as well as by external interventions, such as the use of psychoactive drugs or even through the media we consume.

In Connolly's analysis, *a priori* inside/outside distinctions are blurred beyond recognition. If neuroscience has the goal of explaining the functions of the brain, the role of neuropolitics is to re-conceptualize these functions in terms of the powers they marshal and to explore the opportunities for political insight and action that emerge out of brain-body-culture interactions. Connolly's approach to neuropolitics is largely concerned with understanding the neurological processes that exist below the threshold of consciousness, and how the effects of subtle *memory traces* can be seen as part of a technology of the self and as a site of political contestation (2002).

In addition to Connolly's conception of neuropolitics, political theorist Jacques Rancière's notion of the politics of aesthetics, and the *distribution of the sensible*, provide another set of theoretical foundations and commitments for the dissertation, which will be discussed in greater detail below.

Neuropolitics politicizes the emerging powers associated with the increasing attention to and facticity of the brain, and questions how the tools of visualizing, modifying, and controlling the human brain (inside the cranium and in the extended cognitive environment) influences the kinds of futures we can imagine, and the choices we make from those images. Australian theorist Andrew Murphie has identified one of the core dilemmas facing neuroscience and politics today, that is, "the more that is claimed for the central powers of the brain, or for what might be held within the brain, the more the brain seems subjected to pre-arranged powers (as opposed to

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participation within them)" (2006). By amplifying and utilizing the resonances between Connolly's *neuropolitics* and Rancière's *distribution of the sensible*, this dissertation provides an original and productive viewpoint from which to observe (and intervene in) the politics, power shifts, and governmentalities of the neurocentric age.

The "neuro" of neuropolitics

Neuroscience is the study of the brain and the nervous system, but it has come to be associated with many distinct bodies of knowledge from computer science to philosophy. This dissertation relies on a broad definition of the "neuro" in neuropolitics, including terminology and approaches from cognitive science, philosophy of mind, ethnography, computer science and other fields that are uncovering the functional details about how human brains interact and use their environments for embodied thinking. It takes an expanded view of the mind as not simply a product of the brain in order to understand the systems that make the mind possible.

The subtle but seismic shift in perspective here is that "the mind is just less and less in the head" (Clark 2004, 4). With that being the case, it stand to reason that there are many more things from the body and our environment that *matter* to consciousness and cognition, and that deserve more attention in the study of how thinking occurs. An essential part of being human is the ability to "offload" and recombine cognitive processes with technology and the environment—allowing the mind to have access to a much greater repository of personal and civilizational memory, and to take-on more complex puzzles and abstractions than would be possible if everything was kept in the head (Dror and Harnad 2008). Much like McLuhan's theory of social change: "we shape our tools, and thereafter our tools shape us" (1964, 4), developmental psychology has shown that we spend our childhood adjusting our mentality to the world, and thereafter we spend most of the

rest of our lives adjusting the world to our mentality (Vygotsky 1978). As a society, we are just beginning to comprehend what this means to how we conceive of ourselves, and where to locate the mind in the design of new systems.

The locus of cognition

Every morning my computer and I wake up together. I set it to "wake up" in the morning, but it is much more than an alarm clock. It is more than my morning coffee, brushing my teeth, or other rituals of waking. I am not truly awake until I have accessed the information on my computer: picking up on the notes half-thought and blog posts half-read, checking for new emails, trolling through Twitter and my social networks, and getting the morning's news. Cognitive scientist and philosopher Andy Clark tells a story about how he felt like he had had a stroke after losing his laptop in an airport (Clark 2004, 4)—a state of disorientation and confusion. Many people are becoming more intuitively aware that their networked computing machines, from their desktop computer to their mobile devices are not just similar—but *are*—functional extensions of their minds.

The relationship between mind and machine is often symbiotic. There are things the human mind does well, like hitting a moving target with a projectile, and things it does not do as well, such as complex computations or remembering fine details. The brain is, as Clark puts it, "bad at logic, but good at Frisbee" (Clark 2004, 5). However, the human mind is a master of using and designing its environment to make it smarter, or at least increasing its control. Some simple examples are writing down numbers in long arithmetic sequences, or using visual cues in our environment (like a string around the finger) to trigger a memory. These techniques become naturalized—a fully integrated and unnoticed part of everyday cognition (Clark 1997, 2004; Hutchins 1995).

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The synthesis of a politics of aesthetics and extended/embedded cognition produces new approaches and conceptual tools for developing neuropolitics. Neuropolitics, especially then, involves understanding our *locus of cognition*: the site where history, politics, technology, and biological materiality converge around an embodied thinker, conditioning the quality of thought. Much like the analogous concept of a *locus of enunciation*, which places both the speaker and the words spoken within a context of history, politics, and power (Shapiro 2001, 3), *locus of cognition* integrates the multiple layers of the cultural, biological, and individual as it also brings attention to the political ecology of mind.[7]

By attending to the *locus of cognition*, one can acknowledge the neuropolitical stakes of such things as unequal access to information, (dis)advantageous cognitive environments, the mind control of cultural practices of meaning-making, evolutionary influences on processes of thinking, and even the *micropolitics* of disposition, comportment, and habit. This concept foregrounds questions of *where* and *what* we are, how we process and relate our thoughts, and how these expressions are made meaningful. Simply, *locus of cognition* enables a politics of distributed cognition, one that avoids the pitfalls of the "individualistic isolationist biases" that characterized early cognitive neuroscience (Clark 2004, 221) and that distorts political debate today.

The "politics" of neuropolitics

The roots of theorist Jacques Rancière's 'politics of aesthetics' can be traced to his study of worker movements and political resistance in the late 19th Century France. In *Nights of Labor* (1989), Rancière gives an account of how time and space was rigidly ordered for factory workers, with the goal of allowing enough time for work and sleep, and not much else. Politics

occurred, in Rancière's view, when these workers began to use their limited free time to write poetry, to study philosophy, and to deliberate the principles and values of democracy. The workers' political power was born when they demanded, and exerted, their "right to think." These demands, and the wrongs that drove them to speak, gave the workers a voice that began to be heard in the public sphere. Their voices became "audible" and politically intelligible to those in power. So, to use Rancière's definition, politics is a "redistribution of the sensible" that "revolves around what is seen and what can be said about it, around who has the ability to see and the talent to speak, around the properties of spaces and the possibilities of time" (2004, 13).

Rancière's definition shifts the project of politics and governance from the goal of agreement, and instead looks at how the preconditions of political life are made, and then made invisible. It is not an account of how the "game" is played, but rather how the rules are determined and who is allowed to play. The things most tend to associate with politics—voting, legislation, deliberation—are not *politics* in Rancière's view. These systems and practices are, instead, merely *policing* the boundaries of pre-established order (2004).

So, a neuropolitics based on Rancière's notion of politics as a redistribution of the sensible points our attention to disruptions in the sensible order. This approach to neuropolitics is not to exclude discussion of brain scans for political preferences, methods for cognitive enhancement, or the practices of mental surveillance, but to locate and contextualize those practices within a more robust and generative theory of political and social change. A passage from lawyer Brent Garland's introduction to *Neuroscience and the Law* (2004) epitomizes the position that I want to challenge and push beyond:

> Developments in neuroscience may well have substantial
> impact on how the law views people and behavior, but the

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legal system should be able to assimilate and use even revolutionary science without upending its own fundamental structure (2004, 5).

This kind of assimilationist perspective shackles the inherent potential for epistemological ruptures from neural technologies and new theories of the mind. It is but one clear example of how incumbent institutional structures and logics are intellectually policed. The assumptions upon which much of our social order is based are changing profoundly, and it is in this transformation that neuropolitics, in contrast to neuropolicing, will emerge.

Rancière's analysis of bounded time and "rights" to think is especially appropriate for a disciplined society of biopower and enclosures. A society of control, however, which is less about bounded time, and more about continual differential modulation of thought, in which the same person negotiates a shifting terrain of roles, access, and expectations, is more complex. A control society is much more dependent on networked layers of differential interactions and temporary articulations of speed and distance, and this it is much more unstable and unpredictable.

While Rancière focuses on the forces of political emergence into the intelligible order, Connolly's neuropolitics focuses on the political force of thought bubbling below the surface of consciousness. Connolly takes the *unthought* as an object of thought—emphasizing the "unheard" or "silent" memory traces that, while not reaching the level of consciousness, do have a profound effect on the movements of the mind. They lurk as somatic markers and memory traces, only bubbling up only occasionally into the conscious mind, but still can be tuned by politics, culture and technique (Connolly 2002). Without losing the force of interruption, neuropolitics also needs to address the important micro influences acting below sensibility, but which still make a difference.

Put together, Connolly's ideas about the neuropolitical importance of thoughts, feelings, and emotions "below the surface," and Rancière's notion of politics as a *re-distribution of the sensible* allow us to productively engage with the issues, opportunities, and challenges that neuroscience, cognitive science, and neurotechnologies have generated. And although the emerging issues are centered around the brain and mind, they are producing forms of power that are spilling out into the broader world in meaningful and novel ways.

The Delicate Force of Neuropower

"*Japanese poetry never modifies. There is a way of saying boat, rock, mist, frog, crow, hail, heron, chrysanthemum, that includes them all*" Chris Marker, *Sans Soleil* (1983).

The forms of power that are emerging from changes in technology, science, politics, and economic organization are both more transparent and less tangible than previous forms. In a sense this power is stronger, more precise, and more transformative than previous forms, yet it is also more ambiguous, uncertain, and fragile. The myriad ways our brains and minds are being modified by technologies, pharmaceuticals, medicine, education, media, social networks are part of the daily news stream and have created a small publishing industry around the description and analysis of the implications of neuroscience (Chorost 2010; Garreau 2005; Lynch 2009; Small 2008). Yet, we can also simply say "mind" and conger all the almost mythical permutations and potentialities that our collective consciousness possesses.

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In exploring neuropower, I am not attempting to construct a general theory of power, but rather to examine particular forms of control and associated changes in the values, priorities and practices of governance as we are witnessing it form right before our eyes. There are, however, some common aspects of power that are relevant to understanding neuropower.

Power is everywhere. The various forms of control that shape the way we live life don't exist merely in the systems and mechanisms of enforcement. They may only become most clearly manifest during episodic moments of conflict or direct encounter, but they are in a sense always present—constitutive, distributed, and recursive—taking shape in new ways depending on the historical context and given situation.

Power is opportunistic. The systems and people in power use their capacities to both impose order and exploit structures within a given system. Often working at points of intersection and articulation, forces of control manage the language and protocols between individual agents and the system.

Power is sensitive to distance. We know that power corrupts, but the source of this corruption has to do with the level of isolation of those in power. Recent research has shown that the social distance between a person in power and their "constituents" is related to the relative levels of empathy (or ruthlessness) of those in power. Summarizing the research, science journalist Jonah Lehrer notes:

> Once we become socially isolated, we stop simulating the feelings of other people. As a result, our inner Machiavelli takes over, and our sense of sympathy is squashed by selfishness. The UC Berkeley psychologist Dacher Keltner has found that, in many social situations, people with power act just like patients with severe brain damage. "The experience of power might be thought of as having someone open up your skull and take out that part of your brain so critical to empathy and socially-

appropriate behavior," he writes. "You become very impulsive and insensitive, which is a bad combination" (2010).

Finally, power shapes thought and action by controlling narrative and metaphor. Metaphor is a technology for joining concepts to concrete experience, and shaping metaphorical frames shapes the way we experience life. As the historian Philip Gourevich asserts, "power consists in the ability to make others inhabit the story of their reality" (quoted in Wexler 2006, 210).

The kind of power that resonates more with Japanese poetry than it does warheads and shock troops is both seductive and terrifying. The shifts in boundaries and amplitudes of control are leading to a new kind of governmentality, one that is driven by neuropower.[8] Neuropower is a form of knowledge-power that works through the modulation mental processes, functions, and expressions, for individuals and aggregate populations. Through brain imaging, medical treatments and neuroceuticals, augmentation technologies, digital networks, legal regimes, and guiding conceptual paradigms, neuropower acts on mental functions that were previously unseen, ignored, off-limits, or ungovernable. Neuropower is the enabling logic of a governmentality that sees the regulation of cognition, sensation, attention, mood, and mental fitness as part of its purview and responsibility.

This dissertation will introduce and explore in the chapters that follow, at least seven distinct forms of neuropower. These neuropowers are emerging in a wide range of contexts, from the cutting edge of medical imaging to high risk security zones to consumer technologies for media creation and sharing. They are also distinct in modality, from direct intervention and control to more subtle conditioning of the sensible and the thinkable. Put together,

these seven neuropowers signal a shift in the modality of responsibility and method of control for our formal and informal governance systems.

1. Mental surveillance

Already, via our public and private electronic chatter, our minds are being mined by intelligence agencies, commercial entities, and the many eyes of our digital networks. Sophisticated data portraits and patterns of our thoughts, desires, moods, and preferences can be gleaned from this information as we spend much of our lives "mindcasting" to the world. Our cumulative expression on the Internet is an invaluable source for understanding (and exploiting) what's inside our heads, and for predicting our behaviors (Giles 2010).

But more immediate and direct means of neural surveillance are also being developed and implemented. The so-called "No Lie MRI" and the next generation of lie detector tests that use the latest in neural imaging technologies are being tested for use in police investigations and as evidence in courtrooms These technologies are already making a difference in jurisprudence. Evidence from an EEG device called the Brain Electrical Oscillations Signature (BEOS), was used to convict a woman of murder in India last year (Saini 2009).[9] An Israeli company, WeCU ("We See You"), and the US Government's Future Attribute Screening Technology (FAST) are current systems being tested to glean the intentionality of a suspect through a combination of agent interpretation and neuroimaging, body language, temperature, and other physical data. Mental screening is likely where we will first encounter neuropower, and it is set to become a regular part of our lives.

2. Brain facticity

"The most elementary aesthetic act," says cybernetics theorist Gregory Bateson, "is the selection of a fact" (1972, 458). Neural imaging, computational brain simulations, and neuroinformatics are creating mountains of new data and metrics for visualizing and mapping the brain. Informatics is the new grammar for understanding biology and the brain. Where neuroscientists once sketched crude geographies of brain function based on studies of patients with traumatic injuries or known neurodegenerative disorders, researchers now have a battery of high resolution tools to see and quantify how neurons fire together and how functional regions wire together across the brain. Resolution of neural imaging is improving quickly, and we are getting a clearer, more immediate picture of how brains work in real-time. More and more of the brain and our mental activities are being measured and becoming "facts."

With new facts come new baselines for mental states, cognitive abilities, and other neural functions. New measurements and metrics for normality are emerging. Most people in the industrialized world know with a high degree of accuracy what their "vitals" are. People closely monitor weight, heart rate, blood pressure, cholesterol, et cetera, and also know how their vitals stack up in comparison to the larger population. This data is part of how many people craft their social identity and measure themselves against the common expectations for healthy living.

These measures are known and sensible because they are the health metrics of biopower—the form of power that has governed "life" for generations. Now a profound shift in knowledge-power is occurring. Consumer-level genetic testing and profiling is becoming widely popular, led by companies like 23andme and My Daughter's DNA. These companies' customers are

learning how their genetic profiles reflect certain health outcomes, and how these projected outcomes compare to the population.

In an age of neuropower, there will be a whole new constellation of measurements, metrics, and knowledge formed around cognitive and emotional states. Soon, people will come to know (and obsess) over their average dopamine levels, brain fitness scores, working memory capacity, and optimal concentration range. Taking that information, many will then cognitively train or neuromodulate in order to *do something* about those scores to bring them into optimal states. Population-wide measurements of happiness, mental acuity and productivity will be gathered and fussed over by officials. Government policy shifts to develop cognitive ergonomics to help raise our mental effectiveness and to track our progress over time will soon follow.

All this new information about how our brains work, as individuals and in the aggregate, is creating new dilemmas for researchers and for policy-makers to manage these knowledge-powers and protect people from potential abuses. As genetic researchers eventually learned, "information can be as toxic as a dangerous drug" (Green 2007). Neuroscientists are rightly worried that their research could be used for social control. An early signal of this anxiety is reflected in a pledge being circulated amongst neuroscientists, signatories of which "refuse to participate in the application of neuroscience to violations of basic human rights or international law (Bell 2010). But it's not just state actors who will be involved in ethically ambiguous applications of neurotechnology. The market, the workplace, and the educational system are creating new incentives and desires as well.

3. Neurocompetitive environments

As the old business adage goes: You can't manage what you can't measure. With new imagining techniques and neuroliteracies also come new expectations for interventions. These expectations and desires will be met by a range of pharmaceuticals, brain training software, neurofeedback applications, and augmented cognition technologies.

But what will people be modulating the brain to do? In a competitive job market, with a scarcity of desirable jobs, the drive for any competitive advantage will be sought out. Better concentration, better memory, better multi-tasking, reduced need for sleep—all these are already rewarded in today's competitive landscape. A recent survey of scientists showed that over 20% had admitted to taking some sort of pharmaceutical enhancement drug—be it Ritalin for concentration, or Provigil for attenuating the effects of fatigue (Maher 2009).

Zack Lynch, President of the Neurotechnology Industry Organization (NIO), calls this the drive for "neurocompetitive advantage" (2010, 95-96). This advantage will entice (or coerce) large numbers of people into the neuroceutical market. It is already creating a spate of policy and regulatory issues.

A 2008 article in the *Journal of Medical Ethics*, provocatively titled "When the Boss turns Pusher," captures the growing concern for potential coercion in the workplace in which non-enhancement is a decided disadvantage. The author calls for a new set of regulations and protections for workers from direct or implied coercion to take pharmaceuticals or other enhancements for improved productivity (Appel 2008). These new potentially perverse incentives, the unequal access to cognitive technologies, and the potential amplified health risks are driving the need and expectation of governmental

intervention into areas of cognitive liberty and the neuroeconomics of augmentation.

4. Predicting and preempting behavior

The logic of surveillance is to gather sufficient information and feedback to effectively intervene to control a system or situation. With single individuals now wielding unprecedented power to inflict mass destruction, governments are bearing greater responsibility for protecting its citizens from these violent acts. Thus governing these intensified and distributed risks requires a form of temporal expansionism. Although a systemic view of the causes and motivations of violence would be welcomed, it is naïve to expect governments around the world to shift their policies in such a way to address these root causes. Instead, there will likely be a continuation of the never-ending battle between perpetrators and the police.

This policing now must push past the border of the cranium, and read our very thoughts. The Obama administration has tasked the Homeland Security and Energy Departments with developing more advanced screening technology, including brain scans, because, as Obama proclaims, "in the never-ending race to protect our country, we have to stay one step ahead of a nimble adversary" (quoted in Tarm 2010). In today's theater of operations, where so-called "super-empowered angry individuals" (Friedman 1998) can inflict massive damage, and where the distance between thought and action is small and shrinking, one-step-ahead invariably means one-thought-ahead.

5. Similarity as equality

A result of acceleration of time and the compression of space is the reduced capacity for parsing sensation. Everything whizzes by like a blur, and one is forced to react and make judgments on the basis of partial and uncertain

knowledge. A flashing blue light in the rear-view mirror sends a jolt of adrenaline racing through the body, the amygdala fires wildly, producing waves of fear and panic. The brakes are pushed as large fines, higher insurance rates, and an angry spouse is imagined. But the blue light was only a neon sign reflected off the windshield of the car behind, and not the police, causing a deep sigh of relief.

What does this sensation feel like at a collective level? The state of heightened fear that defines life now—a world where volatile thoughts lead to violent actions with increasing speed and force, and where security forces are given the mandate of prevention and preemption—behaviors and devices that in any way imply "weapon" are treated *as* weapons. A guerrilla ad campaign for a cartoon movie causes city-wide shutdowns (Smalley and Mishra 2007); geek-art on sweatshirts is seen as an explosive device (Brett 2008); strapping Jewish prayer boxes to your head is an attempt to blow up a plane (Mucha and Steele 2010).[10] (Over)reactions to threats seen at high speed will become more common and risk averse authorities will usher in an age where if it looks like dangerous at a glance, it IS dangerous.

6. Ownership of the extended mind

Ownership and control of information and the technologies of cognition extension and augmentation is a critical political issue. Lobbying and legislation to increase control over all forms of expression, image, brand, invention, and creative content has been very successful. This overall move toward the tighter control of creative content is leading to what Stanford law professor Lawrence Lessig calls a "permission society":

> The rough divide between the free and the controlled has now been erased. The Internet has set the stage for this erasure and, pushed by big media, the law has now

affected it. For the fist time in our tradition, the ordinary ways in which individuals create and share culture fall within the reach of the regulation of law, which has expanded to draw within its control a vast amount of culture and creativity that it had never reached before. The consequence is that we are less and less a free culture, and more and more a permission culture (2004, 8).

The software we use to help us think, create, and share ideas comes with condition of use that give enormous power to the software provider. Although the notion of an 'ownership society' has been tossed about in recent years, in reality, it has become a licensing or renting society. Nowadays, one doesn't typically own the software one buys or even application downloaded from the Internet. These applications are licensed to the user, creating an entirely different set of rights, expectations, and distribution of power than a traditional purchase. This power relationship is important when talking about real property, but it is especially significant and disturbing when it pertains to the scaffolding of the extended mind.

If a company wants to repossess a home for failure to pay, that is a familiar scenario. If it wants to erase or block the use of their software, which might contain photos, or diary entries, or personal emails—products of the extended mind—then that is an unprecedented expansion of control, and one that signals a new boundary of power. Permissions and "guardians at the gates" of the extended mind condition the way technologies are used and shapes possibilities for free thought and expression. Free citizens need the rights to tinker with the technological augmentations in the world, because true democracy requires the ability to tinker with thinking as well, freely and frequently.

7. Metaphors of mind

Understanding the neural correlates of hegemony lies in the power of metaphor and narrative in framing individual and cultural worldviews. The synapse is the location where culture and politics become part of our biology, and where the past and the future are neurologically linked. In other words, envision alternative futures is done with the same neurological systems and brain regions that are used to recall the past (Bar 2009). Thus, whoever controls the metaphors and stories of the past and present, colonizes thought and visions of the future.

Social movements and political revolutions throughout history and across cultures have been spurred by the emergence of new guiding metaphors. The Enlightenment challenged the dominant spiritual hierarchy of the time, offering instead the model of the world as a giant clock, and God as the distant clockmaker. Economic formations, political systems, and social structures were created and configured in this image. Although there have been several scientific revolutions since the height of the Enlightenment, all the major political systems in the world were designed to run as if the world is a clock with predictable outcomes given knowable inputs.

Recently, we've seen the rise of computational metaphors, exemplified by the notion that the universe is a giant "program" that is "running" through the stuff we call matter and energy. In this view, inscription is incorporation, and governance is re-imagined as the writing of code that is executed throughout society. This model, combined with the injection of neuroscience, is leading networked groups, organizations, or nations to see themselves as extended, programmable nervous systems (Gates 1999).

Cognitive models are foundational to construction of political worldviews and systems. As old paradigms like rational-actor theory or individualist-

isolationist models of thought give way to new models of behavioral economics or distributed cognition, political orders and possibilities change as well (Westen 2009). Neuroscience will not only change the way we see and interact with our brains and minds, it will transform our political imaginations.

A fashionable mind: brains at high speed

Speed is changing the governance of the mind with developments in brain sciences and neurotechnologies happening at an extraordinary pace. Western society has seen major upheavals in our basic assumptions and models of the brain and mind. Until recently for example, the prevailing view saw the adult brain as at best in a state of constant degradation. In other words, brains were very pliable and receptive to learning as infants and children, but as adults, the ability to significantly alter our basic neural structures and connections was lost. Neuro- and cognitive science has shown, however, that adult brains are in fact highly receptive to training, and we do retain neural plasticity throughout our lives (LeDoux 2006). Whole industries are being created around these new insights, from cognitive interventions in neurodegenerative and mental disorders to "brain gyms" and continuous, rigorous fitness regimens for the brain (SharpBrains Report 2008).

Imaging technologies are developing rapidly as well, and estimates are being made that resolution of neural imaging is doubling every 12 months (Garreau 2005, 59). Deep brain stimulation, transcranial magnetic stimulation, optogenetics, and other neuromodulation technologies are increasing the reach and the precision of direct neural interventions (Chorost 2011, 130-131).

The result of our expanding capacities to modify the brain at higher and higher levels of precision and control signals unprecedented disruptions to what Long Now Foundation founder Steward Brand calls the: "levels of pace and size in the working structure of a robust and adaptable civilization." These levels are:
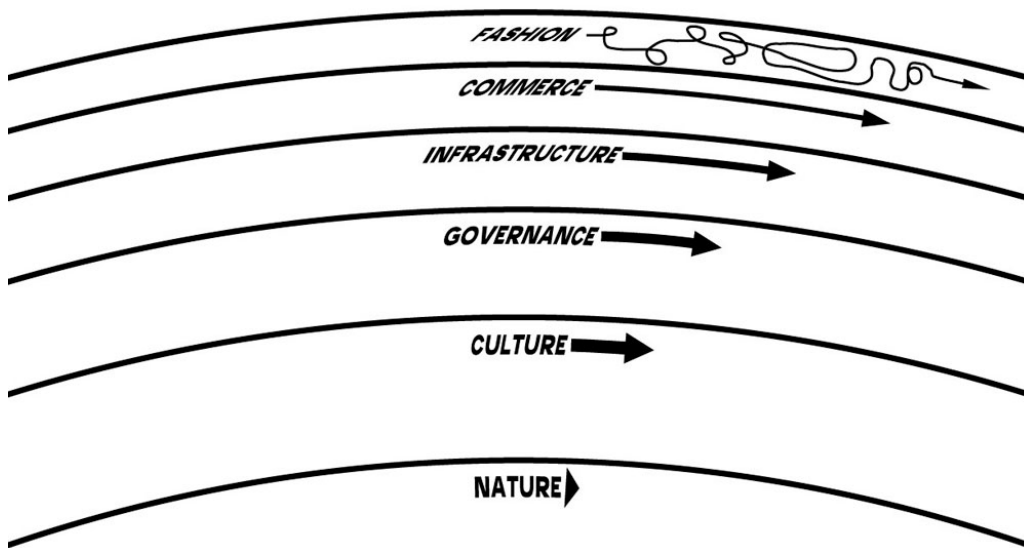
This is a cross section of the pace layering of a healthy civilization.
The fast parts like fashion and commerce propose ideas and absorb shocks.
The slow parts like governance and culture set the rules, maintain continuity, and integrate lessons.
The fast parts get all the attention.
The slow parts have all the power.

--Stewart

FIGURE 2: STEWART BRAND'S CIVILIZATIONAL LEVELS AND RELATIVE SPEEDS [11]

"In a healthy society," Brand argues, "each level is allowed to operate at its own pace, safely sustained by the slower levels below and kept invigorated by the livelier levels above (Brand 1999, 35-36). Each level has its own logic and sensibility that we are in the process of dramatically reordering.

This differential modulation and redistribution of the sensible applies to many of our systems, from our identities to our global environment. In terms

of the mind, however, the speed of change and the expanded reach of control that the brain sciences have generated has catalyzed the faster levels of social change down into the more fundamental, slow-moving (biological) zones.

Speed is permeating the system, increasingly pulling infrastructure, governance, culture, and nature along at the pace of fashion. As acceleration moves down the layers, power moves up them. The resistance to augmentation and enhancement seen in neuroethical debates can be understood from this perspective. Humans are developing the ability to change deep structures of their bodies, minds, and identities with the speed and care (or carelessness) of art and fashion.

The term "cosmetic neurology," coined by the physician and neuroethicist Anjan Chatterjee, reflects this "surface-level" approach to neural and cognitive augmentation, as well as the unease with its association to art and fashion. The role of physicians and clinicians in this new world, according to Chatterjee, will move from being authoritative masters of medical knowledge and practice, to being the gatekeepers of their patients "pursuit of happiness" (2004).

Brand notes, "the division of powers among the layers of civilization allows us to relax about a few of our worries" (2000, 39). As these powers and speeds are conflated, the human species will be increasingly obligated to *un-relax*, to take the wheel of the vehicle carrying all the levels from fashion to nature, and to do so with its foot firmly seemingly planted on the accelerator. What kind of world exists when brains are *fashionable*?

Conclusion: A Vision of Neuropolitics

A progressive neuropolitics involves the challenging of all *a priori* givens of political qualification, and emphasis on the plurality of subjects in politics, especially the differently network configurations among humans. Neuropolitics does not seek an abrogation of difference under the political necessity of a universal sensibility or telos, nor does it seek a communicative unity by technological or any other means. To understand and respond to the grand challenges facing humans in the coming years, political theories are needed to help build and maintain cooperative and democratic communities tolerant of multiple and shifting models of existence and new ways of interfacing with the body and the brain.

The acceleration of just about everything, including neurotechnologies and neuroscience has pushed the human mind into sharp relief. We are seeing our thoughts, emotions, and memories burst into view in the synaesthesia of speed. The brain and the functioning of the mind have become "available" to perception, examination, and contestability in ways and in dimensions never experienced before. Critical thinkers in politics, science, art, philosophy, and culture are, as Hayles notes, "struggling to envision what will come after the fracturing of consciousness" (2001, 15).

Marshall McLuhan offers an evocative metaphor that captures the feeling of this special moment in history:

> Just before an airplane breaks the sound barrier, sound waves become visible on the wings of the plane. The sudden visibility of sound just as sound ends is an apt instance of that great pattern of being that reveals new and opposite forms just as the earlier forms reach their peak performance (1964, 12).

There are certainly "new and opposite" cognitive, social, and political forms taking shape before us: cyborged brains, augmented humans, artificial intelligences, and posthuman subjects are navigating a transformation of mind within the backdrop of planetary environmental destruction. Technoprogressive democracies and technoconservative theocracies are battling for a foothold in a society of control networked from synapse to street. This dissertation is a seat at the window, looking out at the human mind as it approaches the "sound barrier." It looks out at the horizon of what possibilities, if any, might lie just beyond the sonic boom. The pressure is building; we are almost ready to break through. I'll meet you on the other side.

Chapter 2: Expressions of Neuropolitics: Diversity, Subjectivity, and Rights

*How embarrassing to be human. –*Kurt Vonnegut*, Hocus Pocus*

Being Human

Whether it is torture camps sponsored by the "defenders" of democracy and freedom, political blindness and cowardice in the face of climate change, mass-murder in the name of Bronze Age deities, or any of the everyday injustices people inflict on each other, Kurt Vonnegut's observation captures the paradox of being a human today. The defining gift of humanity, the consciousness of consciousness, is also its greatest curse. As self-aware beings, humans are forced to confront compounding collective disasters and acknowledge membership in a particularly rapacious species. The ongoing destruction of the planet's environment and its creatures and human injustice is the source of great shame for anyone paying attention. And as individuals, many are embarrassed by the limitations and fragility of their bodies and brains, and by the silly mistakes made in daily life.

Few can tolerate this continual state of individual and collective embarrassment. Embarrassment is typically an emotion that forces action— to run, hide, deflect, or otherwise relieve the piercing stress of shame. So, ways to cure this embarrassment, to raise oneself out of the depths of the ignorant abyss are coveted. Humans have found masterful ways of ignoring problems, by distraction, division, and projection of blame on "others."

Being a globally aware citizen has its paradoxes as well. One can see the planetary-scale impact of collective action, but it makes individual actions seem tiny in comparison. This awareness of scale (both time and space) allows one to off-load and ignore many of problems. Embarrassment is easier to avoid if you are hiding in a crowd. Yet, humans are also developing the tools to measure and compare actions with each other, where individual actions can be seen and judged by the crowd. Measurement tools, like carbon-footprinting, are allowing people to manage individual behaviors with the global scale and future generations in mind. There are strong desires to change our lot, to make ourselves better. One hears it often, "We could be so much more!" "We can and MUST do better!"

Some have proposed that the ability to amplify our cognitive capacity through pharmaceuticals, neural modulation, networked minds, and even the collective intelligence of people playing games is the way to avoid some of the more disastrous scenarios for civilizational collapse (Cascio 2009). These grand motivations are driving forces behind the intentional and unintentional re-engineering of minds and bodies, as well as systems of governance. These motivations resonate and amplify the other forces of neuropolitics and neuropower, a process that will be described below.

As defined in the previous chapter, neuropower is: a form of knowledge-power that works through the modulation mental processes, functions, and expressions, for individuals and aggregate populations. Neuropower is the enabling logic of a governmentality that sees the regulation of cognition, sensation, attention, mood, and mental fitness as part of its purview and responsibility.

Neuropolitics foregrounds how our individual cognitive and emotional awareness, modulation, and generalized responses take on political significance. The ability to radically alter our cognitive and sensory

architecture by chemicals, implants, networked extensions, and other techniques to improve life will create disruptive new political subjects and new political factions. These changes produce, as political theorist Michael Shapiro argues, "reconfigurations of collective modes of existence [that] challenge the dominant understandings and representations of personhood" (2001, 12).

While neuropolitics involves everyone, provocative new identities such as cyborgs, posthumans, augmented, enhanced, artificial intelligences (AIs), chimeras, or robots are becoming politically visible and relevant. In response, the terms "normal," "natural," "unaugmented," and even "human" will be recast and carry evolving and unexpected new meanings. Novel and hybrid political factions are also forming, such as technoprogressives, technolibertarians, and bioconservatives. These factions will transform traditional notions of "left" and "right," "conservative" and "liberal" (Hughes 2009).

This chapter introduces the key dynamics of the race to ease the embarrassment of being human in the neurocentric age. To map these trajectories of neuropolitics, this chapter examines three dominant political frames of reference, or master discourses, and the emergent political practices and the strategies associated with each. These are: *diversity*, *subjectivity*, and *rights*. These three discourses are important not only because they are powerful framing categories in politics today, but because they are often deployed in contexts that bridge theoretical conceptualization with political activism and the lived experience of people actively (or inadvertently) crafting neuropolitical identities, and those who are actively (or inadvertently) resisting those identities. Diversity, subjectivity, and rights mobilize power and condition the range of alternatives for human being. They are technologies of political action, as well as technologies of the self.

Diversity

A greater understanding of the brain and our increasing technical capacity to modulate thought, emotion, and sensation will enable many new identities, and marginalize or stigmatize others. Many of these changes will be framed within, and ultimately transform, the language of diversity. In the political landscape today, diversity is a master discourse, framing issues and identity politics in race, gender, religion, disability, and even natural ecologies. Diversity is, as Haraway notes, a "code of codes" (1997, 261).

The way we think about diversity, and how we deal with differentiation, shape the kinds of approaches and kinds of questions we can ask about ourselves. It has material effects in the types of research that are initially proposed (or not proposed), the types of proposals that are funded, and the types of results that are generated and disseminated in scientific and often popular media. These "game-changing" categories of difference and similarity will be taken into account by our systems of governance, re-mapping the political landscape. Mapping is a process that brings something (like geographical features) into a useful and predictable form. And it begins with careful observation, especially visual observation.

Brain imaging is gaining traction as a primary mode for fashioning a self-identity. Justifying difference and calibrating normality based on brain scan information will drive much of the way neuropolitics impacts the everyday lives of individuals. This high-resolution information about ourselves will create entire new categories of diversity that we will have to deal with in our schools, our workplaces, and in our personal relationships. Through brain imaging that turns electro-chemical signals into meaningful information, we are approaching a moment in time when the brain can "speak" for itself outside the interlocutor of the conscious mind. In other words, the brain

doesn't need a "middle man" to speak for it. However, when this "middle man" is closely related to what we understand as the narrator of the self, indeed as our very personal identity, brain imaging becomes highly destabilizing to our sense of self. So, a critical neuropolitical question emerges: what kinds of people will brain scans make?

Medical anthropologist Joseph Dumit's ethnographic studies of positron emission tomography (PET) explores the way brain scans "make claims on us," and how these claims shape the way we create our own identities (2004). Neural imaging technologies are creating a new lexicon and semiotics of neurological functioning, and by extension, a new language of diversity. "In our encounters with brain images," he argues, "we come face-to-face with an uncertainty regarding our own normality and 'kinds' of humans that we and others are" (2004, 6).

This new language of diversity plays a key political role in the autism community. This community has been on the forefront of a fight over the question of what makes brains and minds different from each other: neurodiversity, and what makes them similar: neurotypicality (Woodford 2006). For those with Asperger's, autism, or other "non-normal" behavioral traits, Harvard psychiatrist John Raney argues, "being given a name and a biological basis for their difficulties represents a shift from a 'moral diagnosis' that centers on shame, to a medical one" (Harmon 2004). Yet, many autistics, like deaf rights advocates we'll meet later, resist both the moral and medical frameworks, and resist the move to be "cured" (Woodford 2006). The social response to the range of neurodiversity (or neurotypicality) conditions life choices for individuals.

Temple Grandin, a high-functioning autistic renown for, among other accomplishments, her cruelty-reducing slaughterhouse innovations (2007) is a passionate advocate for the personal and social benefits of neurodiversity

(2006). She argues that there are at least three types of thinking: visual/picture thinkers (like her), pattern thinkers (usually good at math and music), and verbal logic thinkers. Below is an image of a brain scan she showed at a recent "TED talk," indicating the increased connection between her visual centers and frontal cortex. With the color augmentation to the imaging data, we can clearly see the differences between Grandin's neural pathways (in red, image on the right) and those of a control subject (in blue/image on the left) (Grandin 2010).
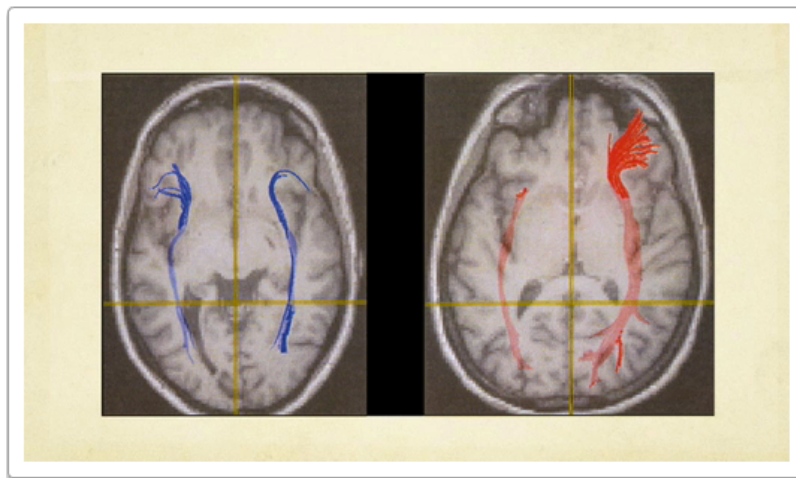
FIGURE 3: TEMPLE GRANDIN'S VISUAL NEURAL PATHWAYS

For the purposes of this dissertation, Grandin's schema for different kinds of thinking is less important than her use of neural imaging to legitimize her claims of a specific neuroidentity.[12] Her whole life, in one way or another, Grandin has been demanding the recognition of her way of seeing the world as legitimate—to her right to think differently. She ultimately secured this freedom and found success in life not only because of her unique talent, but also through her perseverance in the face of many social and professional prejudices against those with autism. Overcoming social barriers helped shape Grandin's life story, but if she started her journey now, she would have a much easier time explaining and legitimizing the way she thinks, simply by pointing to brain scans to confirm it.

This high resolution neuroidentity will come to be used not just to justify a person's place in the spectrum of (a)typicality, but will also become a way to strategically demonstrate particularly coveted cognitive skill-sets and capacities. In fact, some companies, especially those in the programming and computer industries are specifically targeting and recruiting those along the autism spectrum (Carlyle 2010). A brain scan may be an essential part of a resume or CV in the near future.

Brain imaging technologies are politically powerful and disruptive, recasting what we mean by diversity. To explore this further, this dissertation will examine three important re-visions to the map of diversity in the neurocentric age. These are 1. Molecularization, 2. Medicalization, and 3. Objectification.

Molecularization

Governmentality theorist Nikolas Rose has traced what he calls the molecularization of biopolitics. Molecular biopolitics involves a shift from a clinical paradigm which focuses attention and intervention on the "molar" level—the level of "limbs, organs, tissues, [and] flows of blood"—to one that understands life at the level of recombinant DNA strands, protein folding patterns, ion channels, synaptic transmission, and so forth (2006, 11-12).

This shift in the clinical gaze and explanatory schema is not merely a trendy new way of talking about health or explaining disease. It is, as Rose argues:

> a particular way of thinking, seeing, and practicing. It involves
> formulating statements that are only possible and intelligible
> within that way of thinking. Elements—terms, concepts,
> assertions, references, relations—are organized into
> configurations that count as arguments and explanations. [This

shift] embodies a way of identifying difficulties, questioning arguments, identifying explanatory failures—a mode of criticism, error seeking and error correction. [It is] about what *it is* to explain, it is also about what *there is* to explain (2006, 12).

Moving from a "low-resolution" molar gaze to a "high-resolution" molecular gaze, the assortment of characteristics that are important for action change as well. New rules apply to how we intervene in bodies and systems, and previous diagnostic and treatment regimes (with all their history and politics) are thrown into flux. Conceptual categories and divisions at the molar level, even as profound as between living and non-living matter, become blurred at the molecular scale. As organs and tissues are turned into codes and information patterns, they become:

manipulable and transferable elements or units, which can be delocalized—moved from place to place, from organism to organism, from disease to disease, from person to person. ... Molecularization is conferring a new mobility on the elements of life, enabling them to enter new circuits—organic, interpersonal, geographical, and financial (2006, 14).

This fungibility of the basic elements of life challenges our typical approach to diversity. Molecularization is increasing the pace of change and rendering old categories anachronistic and even counter-productive. New levers of control, new points of intervention, new properties to be exploited, new forms of life to be invented, and new communities to be generated, open up unprecedented new realms for political contestation because choice is introduced into what was once random or outside the bounds of human action. The knowledge of a characteristic or condition at an early stage, say a genetic disorder, and the medical capacity to treat it (or not), creates a series of new responsibilities and ethical dilemmas that impact individuals, families, and societies. Thus, the clinic becomes a key site for bio- and

neuropolitics, and it is the process of medicalization that systematically, but unpredictably, directs people to the clinic as a space of action.

Medicalization

As molecularization has re-drawn the map of difference by making life at minute scales intelligible, the awareness of the properties and processes that lead to differences and the ability to modulate (or treat) those differences has lead to the medicalization of many human traits and behaviors. In the neurocentric world, we see an ever-blurring boundary between traits and behaviors that are just part of the diversity of human existence, and those that are being thought of as medically relevant.

When major social shifts occur, new knowledge-powers are created to measure and manage life. And, in the west it seems, the more information we gain about certain behavioral conditions, the more we tend to place them under the health and medicine umbrella (Foucault 1973). We once treated the agrarian cultural aversion to the "clock time" of the industrial world as a disease. Today, we treat hyperactivity, attention deficits, and mood disorders, especially in our children, as aberrant conditions (Conrad 2007).

Addiction to alcohol, as well as to overeating, gambling, sexual activity, and much more, is often considered and treated as a disease, bringing these behaviors into the medical arena. Technologies are at the heart of many of our cultural behavioral shifts and new habits. At first, we treat those who over-engage with these technologies as behavioral problems, like the "internet addiction" rehabilitation centers that are thriving in Korea (Fackler 2007).[13] However, over time, those who do not adopt the new norms and behaviors associated with certain technologies are the ones stigmatized (and often medicalized), as the Luddites of the early industrial period who resisted the "more efficient" mechanical looms are today.[14]

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Additional understanding of how the mind works will open up to "treatment" even more domains including everyday behavior, personality, cognitive functioning, emotional sensitivity, and sensation itself. The knowledge-power generated by the discovery of neurological correlates to certain behaviors and personality traits will begin to re-frame a host of individual decisions.

Right now, when parents take their infant to a pediatrician, he is weighed, measured, and tested for basic responses. We are then told what height and weight percentile he is compared to his peers. If underweight, we vow to feed him more. If overweight, we vow to regulate his food intake more vigilantly. Thus, we enter into, contribute to, and modulate our behaviors within a vast network of knowledge—a system of tracking that helps us modulate our habits and behaviors—to create a body that is in compliance with the norms of society as defined by those persuasive percentiles.

Later in life, this child enters pre-school and his interests and aptitudes will be measured and compared to his peers. We'll know if he's average in this, or exceptional in that. But imagine a future, not very far off, where this child's brain is routinely scanned by an fMRI for cognitive abilities and emotional traits such as shyness, aggression, or empathy. Those scores will be the ones parents agonize over, and those numbers will change how they interpret and treat their children. The precision with which we as individuals, families, groups, and societies create compliant minds will be unprecedented.

Normalization is important politically when the non-normal is medicalized and treated in an effort to return individuals to the acceptable ranges of difference. The backbone of the form of neuropower I've called "brain facticity" will be the generation of baselines about neurological functioning. Neuroscientists Alex Carter and Maurizzio Corbetta of Washington University in St. Louis have found that a technique for looking at baseline activity, called

"resting-state functional connectivity" (Carter et al., 2010). This technique is useful for predicting the nature and severity of brain trauma or injury by looking at how each region in the brain is connected. Having this baseline connectivity information in hand when a patient comes in with a stroke will greatly aid doctors in their treatment speed and effectiveness (Moore 2010).

These baselines are preliminary foundations for scanning to expand from a clinical setting into new domains. An early signal of this move for pervasive neurological scanning is a new policy by the National Football League (NFL) to require a "baseline brain scan" for all new players (George). This baseline will both help provide a comparative measure for that individual player if he has a head-injury, and it will allow the NFL to begin to track league-wide tendencies and trends, both during playing days and after. Other sports and other divisions, down through little league sports, will implement this policy in the coming years, as scanning technologies become less expensive and more accessible (Ormsby 2011).

From the womb to our deathbeds, we will increasingly be looking for ways to improve our cognitive functioning and mental health. Women "who are pregnant or may become pregnant" (in the parlance of those incessant pharmaceutical ads) are encouraged to take prenatal supplements with docosahexaenoic acid (DHA), an omega-3 fatty acid good for fetal brain development. The search for "neurocompetitive advantage" will permeate our homes, our schools, and our businesses.

Neuroenhancing pharmaceuticals are now being taken by students looking for an extra study edge, another recent survey showed that 20% of scientists in major research labs are taking some form of pharmaceutical enhancement (Maher 2008). As neuroethicists Martha Farah et al. write, "we risk undermining the value and dignity of hard work, medicalizing human effort and pathologizing a normal attention span" (Farah et al., 425). And as baby

boomers hurtle toward old age, we should expect to see an enormous increase in drugs, interventions, and brain fitness tools to stave off the neurodegeneration associated with aging. Medicalizing the aging mind is a potentially huge new market. Brain gyms, cognitive fitness routines, and auto insurance incentives for brain training are becoming part of the behavioral and economic landscape of healthy aging (SharpBrains 2010).

So, the desire for more information about the brain—initially to help with injury or specific condition—combined with the advanced imaging and computational tools for processing this information will lead to a future in which brain scans will become part of our regular medical routine. It will be information we carry with us, and it will more and more define us.

Objectification

Finally, the way we think about diversity changes as we objectify the subjective. To illustrate this, take the example of pain. What is pain? It can be described in graphic terms of specific injury or affliction, or the feeling can be put into affective imagery. The experience of pain is one of the most difficult feelings to visualize, measure consistently, or compare effectively. While higher blood pressure, change in gait, and other methods have been used to quantify it, pain has been only communicable in subjective terms.

However, neuroimaging is beginning to enable the objectification of the symptoms, feelings, and conditions associated with pain. In December 2008, Dr. Robert England received a patent for the use of fMRI to validate and measure the neurological signals of pain. As he has noted, "now we will be able to move on to the next step of introducing a commercially available process that will aid the medical community in objective identification and measurement of chronic pain. This process is able to turn subjective complaints into objective findings" (quoted in Goldeen 2009).

These findings could have many beneficial medical applications. For example, Dr. Sean Mackey, Director of Stanford University's Systems Neuroscience and Pain Lab, has seen positive results from his experiments with fMRI-based neurofeedback is as a possible pain treatment. As the neuroscience blog Mind Hacks summarizes the process:

> a patient with chronic pain is shown real-time activity in their anterior cingulate cortex, an area in the frontal lobe associated with the 'unpleasantness' of pain (rather than just its physical sensation), and they can see when they are doing something to successfully reduce the activity and can try and learn to do it reliably (2009).

Although the research is still preliminary and results remain to be reliably confirmed, start-ups offering neurofeedback techniques are springing up and offering services for desperate (and high-paying) customers. Mackey remains skeptical of the claims of these companies, but this trend indicates the techno-scientific, market, and cultural forces are ready and able to accelerate the development of neurocentric health (Vance 2009).

Brain images allow us to take what was once a "feeling" or "emotion" or "state" and create a representative score or measurement to objectify our experience. Neural imaging techniques, neuroinformatics, and computational simulations of brain functioning are leading to what Joseph Dumit calls "objective brains" (2004).
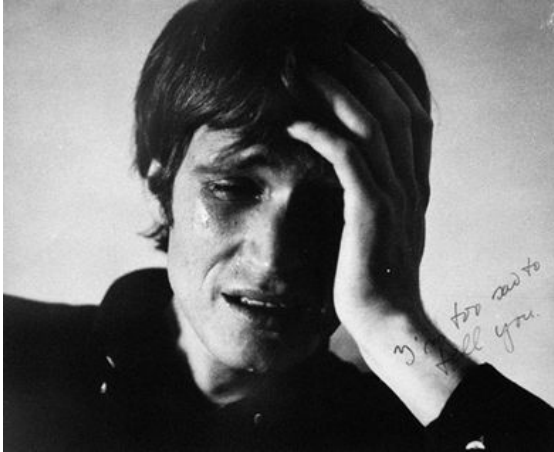
FIGURE 4: IS THIS WHAT SADNESS LOOKS LIKE? [15]
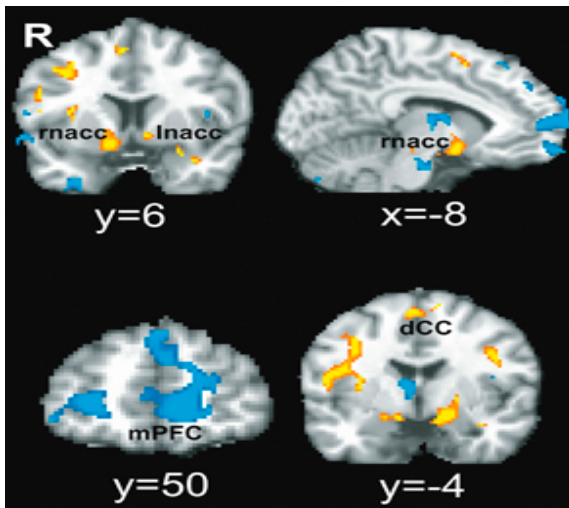
FIGURE 5: OR THIS? (NEURAL CORRELATES OF DEPRESSION) [16]

Some of the most difficult to define (much less to quantify) human feelings, like compassion, love, or sadness are being correlated with neurological regions and circuits (Lewis, Amini, and Lannon 2001). They are being imaged and turned into comparable visualizations. Compassion, for example, involves the precuneus, posterior cingulate cortex and retrosplenial region areas of the brain—areas associated with bodily regulation and emotion, not just cognition (Immordino-Yang et al., 2009). Compassion, even in the language of medical imaging, runs deep.

Even when confirming many of our folk beliefs, neurological imaging can be a disrupting political force. Women, for example, tend to show much more compassion on average (as judged by neural activity) than men, leading to what's called in the literature, the "compassion gap" (Harenski, Antonenko, Shane and Kiehl 2008). How will we as a society account for these "objective" differences in brain functioning? Will we try to rectify it? Will we design our social systems to take advantage of these differences? Or will this information be used to reinforce stereotypes that make social mobility more difficult?

This "objective" information is becoming part of how we identify ourselves, and how we are defined by others. While we will be inundated with new claims of insight based on brain scans, we must remain critical of how we use these very persuasive images (Dumit 2006, Weisberg et al. 2008). There are many opportunities for abuse. The research, and especially the images that are generated as evidence and illustration, are in a premature scientific state. Conclusions and theoretical paradigms built on these images must be stated carefully. We may be, as Carl Zimmer laments, "unconsciously shoehorning neuroimaging results into social categories that may not have biological meaning" (2004b, 43). Or similarly, as Dumit warns, "visualizations used in this extreme and exemplary fashion thus function as powerfully potent transformers of statistical norms into ideal and abhorred qualities" (2004, 156).

When you combine the ability to observe and measure processes in detail with the ability to modulate and manage those differences, we move closer to the day when we can re-make ourselves in whatever image we choose. That is a god-like power. And, as this tongue-in-cheek neurocentric prayer from the Neuroskeptic blog attests (2010), neural imaging is becoming an ever-present panopticon, the new eye of God:

The Scanner's Prayer

Our scanner, which art from Siemens,
Hallowed be thy coils.
Thy data come;
Thy scans be done;
In grey matter as it is in white matter.
Give us this day our daily blobs.
And forgive us our trespasses,
As we forgive them that trespass onto our scan slots.
And lead us not into the magnet room carrying a pair of scissors,
But deliver us from volunteers who can't keep their heads still.
For thine is the magnet,
The gradients,
And the headcoil,
For ever and ever (at least until we can afford a 7T).
Amen.

From Embarrassment to Exuberance: Michael Chorost's Cyborg Subjectivity

Becoming a cyborg

Due to his mother's rubella infection while he was in the womb, Michael Chorost was born with significant hearing loss. He could hear loud sounds, but did not have the auditory resolution to understand spoken words. Had he been diagnosed just 6 months later in life, or had 5 decibels less hearing, he would not be able to understand spoken language at all, and would have likely spent his life communicating by American Sign Language ASL (Chorost 2005).

Chorost's personal experience and identity was, like all of ours, a product of a complex array of biological, social, technological, and historical forces. The degree of immune system reaction to the infection, living in a time and place where the public health monitoring infrastructure allowed him to be diagnosed at a young age, his family's ability to afford treatment, the availability of a range of mechanical hearing aids, the perceived social and personal advantages of being "mainstreamed," and a myriad of other idiosyncratic factors determined how Chorost adapted to his unique sensory world and influenced the range of his choices in life.[17] These conditions set in motion his eventual transformation into a cyborg.

In *Rebuilt: How Becoming Part Computer Made Me More Human* (2005) Chorost describes his sudden loss of all remaining hearing at the age of 36.[18] He recounts in great personal, philosophical, and technological detail the process of getting a cochlear implant. He became an "adult child," re-learning to hear and sense the world in new and different ways (many of them decidedly unpleasant).

Cochlear implants are surgically implanted devices that translate environmental sound into electronic signals that stimulate the auditory nerves directly. Historically, these implants have been a very controversial issue for the deaf community, foregrounding the fundamental right to choose how we sense the world. Through the figure of the cochlear implant, Chorost was able to elucidate the essence of neuropower held within a prosthetic device, and to embody a complex array of social, economic, and technological forces within an individual experience. How did a cochlear implant make Chorost a cyborg? And, what about this new cyborg subjectivity is a preview of the kind of neuropolitics we can expect to see in the coming years?

Chorost takes some pains to define a cyborg precisely, and this care will come to take on a political valence which will come to be important later. For Chorost, a cybernetic organism, or cyborg, is "an organic creature whose body is controlled by algorithmic rules" (2005, 71). Since the term cyborg was first applied to a human-machine hybrid by Manfred Clynes and Nathan Kline in their 1960 article "Cyborgs and Space," the concept has held a powerful place in popular and scholarly culture, albeit a slippery term that has been overly used and abused at times.

To give it the traction to do philosophical and political work, Chorost makes a distinction between his definition of cyborg and those of cultural theorists like Chris Hables Gray and Donna Haraway. These authors, and others, make the case that in today's technologically mediated world, everyone is, in a sense, a cyborg. For Chorost, these types of broad proclamations are too broad to be useful. They are "just a glamorous way of saying that people are complex, fragmented, and contradictory," rather than making clear a fundamentally new kind of relationship between people and their technology (2005, 43).

Chorost also takes issue with claims of cyborg-hood by those like Steve Mann, a computer science professor who has worn prosthetic video and sensory devices for years. The ultimate control of these devices remains with the user, making them fyborgs—functional cyborgs, as Gregory Stock (2002, 24-26) has called them—and not cyborgs. The critical element that distinguishes these other definitions of cyborg from Chorost's is, in my terms, the *locus of cognition*. That is, there is a meaningful redistribution of sensation, perception, and agency. A cochlear implant is a cyborg technology because it is "an artificial sense organ [that] makes your body literally someone else's perceiving the world by a programmer's logic and rules" (2005, 9). *Cyborgness*, then, requires "the presence of software that makes if-then-else decisions and acts on the body to carry them out" (2005, 40).

The redistribution of cognition and sensation that converges around the figure of the cyborg is indicative of larger issues for neuropolitics. A person with a cochlear implant is constantly reminded of the forces that mediate perception. The relationship between sensation and reality becomes a provisional affair, contingent on a complex, global system. A cochlear implant, says Chorost, "has a corporate mind, created by squadrons of scientists, audiologists, programmers, and clinical-trial patients. I would be *in-corporated*, bound for life to a particular company's changing beliefs in the nature of reality" (2005, 10). Thus, the larger story is, as Emily Martin puts it, "the ending of one organizational scheme for bodies and persons and the beginnings of another" (quoted in Gray 2001, 196).

Of course, old systems do not simply and quietly disappear. Change is often orchestrated so that incumbent powers have the chance to reconsolidate and maintain control in the new paradigm. So, we see the new wine of augmented humans in the old bottle of hierarchical power structures. Suddenly, instead of being deficient, those with prosthetic technologies can cast those who have not incorporated machinery or drugs into their brains as the lesser

subjects. These lower subjects are closer to nature, limited by their inferior, emotional, and slow-paced analog brains. It doesn't take long for those who don't incorporate new technologies (especially communication technologies) to be cast as backward Luddites.

Posthuman minds

From this perspective, rather than violating the trope of boundary purity or "human dignity," these subjects transcend the quaint and anachronistic "naked" brains. Cyborged brains may ultimately have wider and more immediate access to webs of information and networks of people than non-connected, non-enhanced others. Their cognition is much more distributed, and while many more agents are involved in the everyday thinking they do, these entities could prosper in the virtual political-economy of cyberspaces, the digitalized simulacra of public spheres. It is a vision already imagined by the prophets of human-machine apotheosis. In inventor and passionate advocate of human-machine integration Ray Kurzweil's prediction of the world of the near future:

> There is ubiquitous use of neural-implant technology that
> provides enormous augmentation of human perceptual and
> cognitive abilities. Humans who do not utilize such implants
> are unable to meaningfully participate with those who do
> (1998, x).

And the implication is clear, those who do NOT utilize neural augmentations will be left behind. "Normality" is inverted from what we expect today, yet normality as a category is still fetishized. Instead of a political sphere in which the reasoning brain must be kept at a distance from all invasions, a dominant cyborg subject defines "naked" brains by their incompleteness and lack. In this world, the fear of losing control *to* machines has been

transformed to a fear of losing control *without* machines. Imagine a time in the U.S when being 'borged-again is more politically important than being born-again (Dunagan 2004).

We are creating new tools and new systems of implementation that will accelerate the feedback loops between our prophecies and our (self) fulfillment of those visions. We must, then, be critical of the motivations, ideologies, and aporias of our visions. Talk of cyborgs and posthumanity amplifies basic human emotions: fear, hope, anxiety, and reverence. N. Katherine Hayles concludes in her book, *How We Became Posthuman*, that:

> the posthuman does not mean the end of humanity. It signals instead the end of a certain conception of the human, a conception that may have applied, at best, to that fraction of humanity who had the wealth, power, and leisure to conceptualize themselves as autonomous beings exercising their will through individual agency and choice. What is lethal is not the posthuman as such but the grafting of the posthuman onto a liberal humanist view of the self (1999, 286-287).

Unleashing the emancipatory potentials that these technologies possess requires understanding how these subject figurations are constructed. Technologies, techniques, and worldviews, when acting through the senses, the brain, and the extended minds, have enormous potential to catalyze both emancipatory and repressive forces. As humans begin to redesign their own brains and craft new subjectivities, "the best possible time to contest for what the posthuman means is now, before the trains of thought it embodies have been laid down so firmly that it would take dynamite to change them" (Hayles 1999, 291). Michael Chorost exemplifies how to contest and construct cyborg subjectivity, and best expressed through his vision for the deaf community to be a vanguard of progressive neuropolitics.

A deaf man's vision of sensation

In 2007, Chorost stood before an assembly at Gallaudet University—the school for the deaf, and told them that deafness as we have known it is coming to an end. He told them that the way of sensing the world that Gallaudet and others in the deaf community have worked so hard to make acceptable, and around which they have built their identity, might become extinct. Deafness is heading toward virtual extinction due to the availability of cochlear implants, better access to drugs to treat infections in pregnant women and infants, and the fact that 96% of deaf children have hearing parents and those parents prefer for their children to be part of the hearing world.

Coming from a "cured" deaf man who had recently written a book praising cochlear implants, this might have appeared as another treacherous attempt by an "Uncle Tom" of the normal hearing world to further marginalize and contribute to the genocide of deaf culture (in the words of a 1991 National Association for the Deaf protest statement).[19] Most of the work of the deaf culture movement has been to remove the stigma and barriers to living a productive life in a hearing-centered world. It has strived to build respect for the distinct qualities and accomplishments of deaf culture—including the original invention and propagation of an entirely new language based on visual communication. It was also to make the deaf "heard" in the public sphere and counted as political subjects. If so much work has been done to make the non-hearing mode-of-being a valued part of the cultural and political terrain, deaf advocates argue, why let it go or be destroyed by new technological implements? Aren't we *all* losing something important and that should be saved?

But Chorost's forecast of the end of deafness was not a betrayal, not a call to give up and join those with normal biological hearing. It was not an attempt

to euthanize a soon-to-be obsolete sensory world from the story of civilization. He offered, instead, a transformational proposal to the Gallaudet students and to the deaf community at large, one that exemplifies the way neuropolitics can be used as a process of negotiating the many layers of sensation, biology, technology, and identity politics.

Contextualized within the story of other cultural and linguistic extinctions throughout history, Chorost proposed that instead of focus identity on deafness itself—and lamenting its extinction—the deaf community could and should become the vanguard of a new movement of sensory perception. Hearing remains a node in sensory identity politics, but it is not a dichotomy between hearing and non-hearing, but rather a range of new and mediated ways of sensing the world. The non-normal hearing community should seize the opportunity to show the nation and the world "new ways of using technology to communicate and build communities" (Chorost 2007). For Chorost, this means the embrace of new neuro-sensory technologies, an indifference to "mere" replication of biological hearing, and a transformation in the conception of hearing. He proposes that this community re-draw the *map* of the audible (to mix a metaphor) making new sounds available to perception.

What this entails: biological hearing is already-based on a process of selective attention and the separation of noise from meaningful pattern—itself a highly political matter as discussed earlier. But biological hearing has limited capacity in this regard. Already forced to re-configure their sense of hearing through introduction of technical implements, hearing "loss" is transformed into hearing "control" and, thus an advantage. Those with next generation implants that work directly on the auditory nerve could *program* their hearing environment, filtering and amplifying certain sounds, and otherwise modulate their sensations and perceptions in ways unavailable to the "normal" hearing community. Imagine filtering out ambulance sirens and

car honking in an urban environment, or transmitting sound from your infant's room directly to your cochlear implant—turning it into a baby monitor. Those with hearing modifications can thus interact and "use" their environment differently, changing their *locus of cognition,* and offering a new realm of experience to the world. It may be the amplification and exuberance, not the diminution, of embodied differences in a sensibility born by technological augmentation and modification that will define the politically-qualified subject. It is this kind of neuropolitics that Chorost points to in his vision for a re-purposed Gallaudet:

> It could be a campus populated by people with unaltered, altered, and enhanced bodies of all kinds, with the common goal of exploring new ways of experiencing the world, new ways of communicating with each other, and new ways of sustaining communities that meet the primal human needs of being understood, being accepted, and being valued (2007).

Emancipation, as Rancière argues, "is the possibility of a spectator's gaze other than the one that was programmed," and it means "knowing that one cannot place one's thinking into other people's head, that one cannot anticipate its effect" (in Kelsey 2007, 268-269). Although the cochlear implant may come with a "corporate mind," the potential for a user to program his or her auditory world points to a new kind of sensory awareness and control. It forces an implanted cyborg to physically embody the concept of political plurality. With plurality, according to William Connolly, "you keep a foot in two worlds, straddling two or more perspectives to maintain tension between them" (2005, 4). This straddling position is precarious, but it is also empowering. "Living in more than one world confers leverage," argues Chris Hables Gray, "and also power" (2001, 192).

Rights

Along with diversity and subjectivity, rights and personhood claims are key discourses to understand how neuropower is being mobilized. The emergence of new political alignments and the growing calls for additional rights and protections for those who wish to augment or modify their brains and bodies will define much of the "place and stakes" of neurocentric politics in the coming years.

What is it about the nature of rights, or "rights-talk" that make rights relevant to politics in the neurocentric age? There are at least three reasons relevant to the argument made here. First, rights have been framed, especially since the Enlightenment, as universal and transcendent. That is, rights are often claimed as a fundamental, inalienable, or natural endowment that comes with basic human existence. Article two of the Universal Declaration of Human Rights is instructive here:

> Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Furthermore, no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to which a person belongs, whether it be independent, trust, non-self-governing or under any other limitation of sovereignty (1948).

Natural rights are considered as proto-political or even originating the political, and are distinguished from legal rights, which are conferred by fiat or legal statute. This naturalization of rights, anchoring the formation of political systems and practice of politics, has been a rhetorical tool used by excluded groups to make their claim to rights and inclusion in public life

(Sarat and Kearns 2002). Groups who are excluded or non-qualified for participation in the *polis* are the actual bearers of human rights and create the necessary conditions for these rights to exist. Therefore, any groups excluded from political participation because of their *non-qualification* have access to the strategic tool of asserting their natural rights, and thus their automatic inclusion in the political process.

The second, related point is that rights are frequently implicated in the negotiation and management of borders and boundaries. Rights define those who are inside and those who are outside. This takes place in a juridical or legal setting, legitimizing those who can participate, but it is also a key factor in more informal social and cultural identity policing. As anthropologist David Engel observed in his ethnographic research in the pseudonymous "Sander County" community of Ohio, the invocation of rights is tightly coupled with a moral universe that distinguished insiders from outsiders (1995, 27-53).

Finally, and especially important in the fluid and uncertain zones of neuropolitics, is the use of rights to "catalyze the imagination," in the phrasing of UH-Manoa political theorist Neal Milner.[20] Those scholars who have taken on the rights of beings who do not yet exist or otherwise cannot speak for themselves are using rights to make visible issues that have yet to be considered by most in the public or especially in our systems of governance. Working with entities in the provocative abstract, rights brings these beings into understandable and negotiable terms. This input of what might be considered novel or even excessive entities into a rights discourse creates cognitive disturbances that allow us to see the systems of social/legal order we have constructed and to re-design the architecture of these revealed structures of thought.

Mobilizing rights

So, rights have been and will continue to be a rhetorical, legal, and cultural tool to negotiate the terms of political participation, but which rights are especially relevant for neuropolitics? To address this question, I will analyze three specific invocations of rights in the politics of human enhancement and cognitive liberty. Each one of these examples emerges from a particular historical context (and unique personality), but represents an important idiom. And, each is indicative of different rhetorical rights strategies we see more broadly.

Rights as Commandments

This first example of a commandment idiom comes from Timothy Leary:

> Two Commandments for the Molecular Age
> 1. Thou shalt not alter the consciousness of thy fellow men.
> 2. Thou shalt not prevent thy fellow man from altering his or her own consciousness (n.d).

This simple pair of rights is expressed as behavioral prohibitions, and use the distinctive idioms of the King James Bible. This formation takes its power from its association with the Old Testament commandments, and, by extension, connects these rules to a transcendental, timeless, and universal set of individual rights. "Commandments," if accepted on their own terms, are meant to apply to human behavior, but are not contestable as such by humans. They are pre-ordained givens, beyond human intervention, and certainly not open to debate or modification.

Even though it is safe to assume that Leary intended a degree of ironic humor in his commandments, we can nevertheless examine one of the key assumptions embedded in them, especially as it relates to larger points about

how rights are imagined. This is the idea of a bounded, or self-contained individual, to which rights are embodied or owned within. As discussed throughout this dissertation, researchers from the brain sciences along with others in social science and philosophy are making a convincing case that the formation of self-hood is an ecological process involving brains, bodies, and other agents and artifacts in the environment. Our mere interaction with others, whether in real-time or by asynchronous communication (in writing, for example), will alter the consciousness and thinking of our fellow beings. Unless we live the rest of our days completely alone and with no communication with others, we cannot possibly abide by his first commandment.

As we imagine them, most rights exist as individually constituted and possessed. But in practice, rights only become active during encounters—as individuals, groups, or governments behaviors bump up against each other. If rights are to be located within bounded individuals, the hybridity, fragmentation, and impurity of many augmented and networked entities will render this kind of rights rhetoric impotent and ineffectual. As bounded individuality becomes problematized and the "fictitious" nature of all conceptions of the self becomes almost canonical in the critical literature, so do the constructed and limited nature of rights become evident.

Thus we may see this tension relieved by a strategy of subordinating natural rights and a corollary expansion of legal personhood. The archetype of legal personhood, corporations, have, since the late 19th century, used the protections and standing of personhood rights as a tool to extend their power and reach (Hartmann 2002). Frank Sudia, a lawyer who has explored the legal rights of what he calls "synthetic citizens," makes the case that the corporate model has already laid the tracks for a rights strategy that will reduce the ripples synthetic citizens make on the calm lake of justice:

As with corporations, we will find entities in our midst that act with centralized decision making, yet their decisions are not the actions of individual humans. *To keep our legal system clean and neat it* will be far easier to just give them legal status, thus enabling most existing laws to apply to them without creating all new ones for them out of whole cloth (2001).

Rights as Amendments

Chris Hables Gray, a sociologist and activist whose book *Cyborg Citizen* examines a series of disruptions related to the political life of cyborgs (2001). Because, says Gray, "all cyborg citizens need their rights defended," and "in the hope of making a modest improvement in the human political condition," he proposes a Cyborg Bill of Rights. Number four among his ten amendments is particularly relevant here:

> Freedom of Consciousness: The consciousness of the citizen shall be protected by the First, Fourth, and Eighth Amendments. Unreasonable search and seizure of this, the most sacred and private part of the individual citizen, is absolutely prohibited. Individuals shall retain all rights to modify their consciousness through psychopharmalogical, medical, genetic, spiritual, and other practices, insofar as they do not threaten the fundamental rights of other individuals and citizens, and that they do so at their own risk and expense (2001, 28).

Here we see many similarities to Leary's commandments, e.g. the freedom from outside invasions and intrusions, and the freedom to modify one's own mind. However, instead of re-creating transcendental affectations, Gray is framing his case squarely within a juridical-legal system—the U.S. Constitution. He first calls forth already existing protections (the first, fourth, and eighth amendments), citing this sacred precedent as he adds the previously unenumerated rights to modify one's conscious mind with "psychopharmalogical, medical, genetic, spiritual, and other practices."

Gray also draws the boundaries of his rights at the edge of the individual. Not only does this amendment prohibit behaviors that threaten others' rights, or that add risk or cost to society at large, but it puts up a barrier to search and seizure at the edge of our consciousness. Within a world where the enclosure of the cranium does not hold the entire mind, where search and seizure begin and end would be a hotly contested border. Are passively obtained brain scans of people in public unconstitutional? And even more complex, are the thoughts and memories we store electronically enough of a functional part of our sacred minds that we could put a privacy fence around them?

Rights as Manifestos

Finally, we look at a section from extropian evangelist Max More's "On Becoming Posthuman" (1994). Manifestos as a genre are politically powerful in that they are usually aggressive assertion of rights. They make "manifest" as series of wrongs. Those who are wronged then erupt as new political subjectivities. These are often individuals or groups who have not been "counted" before. A rather long passage is useful to show how the turns of the argument are played:

> The contemporary medical paradigm embodies a distinction common to our culture: The sharp distinction between curing disease and enhancing function to extraordinary levels. Doctors see their job as remedying disease and defect, not as augmentation of already-healthy function. I see this as related to a limited conception of "the natural". When we cure a defect, we simply make things as nature (or God) intended. It's unnatural, it's said, to live without end, or to boost the body and brain beyond the norm. Thus, we find acceptable psychiatric drugs but reject intelligence-boosting drugs; we practice heart surgery but not deep-freezing the barely dead.

> Yet we *should* regard transhuman transcendence as natural. Nature embodies within itself a tendency to seek new complex

structures, to overcome itself to take on new, more effective forms. Nietzsche recognized this in his view of the universal will to power. More recently, we have partly uncovered this drive towards complexity through complexity theory, evolutionary theory, artificial life, and neurocomputing. Overcoming limits comes naturally to humans. The drive to transform ourselves and our environment is at our core (1994).

In this passage we see how More uses many of the tropes common to rights talk. First, there is an explicit alignment with shared community values: "a distinction common to OUR culture." Second, he uncovers and rectifies a conflict between two supposedly equally valid positions: 1. the desire to make the sick or infirmed well and whole by medical intervention, and 2. Our "natural" desire to seek to improve our condition, "the drive to transform ourselves." It's easy for this drive to lead to excesses, as we see all too frequently with performance-enhancing drug scandals in the sports world, but the drive itself, if we follow the argument, is part of what makes us human.

By framing both as equally natural, and equally legitimate cultural drives, there is no transgression. Augmentation and enhancement are no longer excessive, they are part of the human desire to overcome limits, and one that should not be infringed upon. In fact, this activity should be encouraged and supported by the institutions, policies, and agents within society.

Commandments, amendments, and manifestos represent different political strategies appropriate to differences in political status, visibility, and power. If allowed a bit of theoretical license, we could say that commandments come from above, amendments from within, and manifestos from below. The neuropolitical space of cyborgs, artilects, posthumans, and hybrid forms will

see actors occupying all these levels, and deploying and resisting the idiomatic dynamics at each.

Backlash: rights as excess

Much of the rights discourse surrounding enhancement and rights for cyborgs and posthumans follows along the archetype of "special rights" analyzed by Uh-Manoa political theorists Jon Goldberg-Hiller and Neal Milner (2003). As defined by the authors, special rights are "those invocations of rights that seek to oppose or to qualify other forms of rights mobilization by reference to the excessive quality of the original rights claims. As a mark of this excess, opponents often say these claimants are seeking 'special rights'" (2003, 1076).

Critics from across the political spectrum have in particular decried the precociousness and the moral impropriety of augmentation.[21] In this line of argument, those who advocate for or engage in human enhancement are privileged and selfish individuals who are outside the bounds of community (and in this case, basic human) norms. As discussed earlier, the initial response by some in the deaf community to cochlear implants fits this pattern. Not only were those who received cochlear implants violating a set of beliefs and values in the deaf community, they were engaged in a practice that could possibly lead to the genocide of "deaf culture."

Those who claim rights for posthuman augmentation are the aggressive forces looking for special accommodation in a previously stable and equal rights landscape. In a process called "inversion," those who are claiming "special" rights are "transgressors, everyone else are victims of this violation" (Goldberg-Hiller and Milner 2003, 1078). Rather than seeking the protections of cognitive liberty and the right to morphological freedom, those seeking rights to enhance will render those who do not meet their criteria for

"fully enhanced" personhood invisible, or even sub-human. This sentiment is expressed in a recent post in the bioconservative web journal, *The New Atlantis*:

> If [infants and Alzheimer's patients] are already having trouble being recognized as people, how will they — and the rest of us — fare in the posthuman age? The posthuman age will be defined by the dissolution of any shared notions of who we are and what is valuable about us. One of the new sorts of beings may be great in some way that is totally unrecognizable to the many other new sorts of beings. It may no longer be just the weakest human beings who will have trouble making the case for their worth in a way that others will understand. 'Rights,' 'equality,' and 'tolerance' may well lose their meaning in such a world (Shulman 2010).

Because posthumans or cyborgs (or those who speak for them) demand the right to exist and modify their minds and bodies, rifts are created in the fabric of human equality. And in these rifts, the argument goes: those "superior" beings will suppress and dominate those who were once "natural" and "normal." As with all rights discourses, this reflects the power of rights to name and legitimize some and delegitimize others. Those who control this naming have the power.

Another archetypical version of the excess story comes from Patrick Dodson (2001), an aboriginal scholar and activist, in his response to Inayatullah's (2001) argument that robots should and will have some rights of personhood. Dodson first recognizes, like Inayatullah, that rights are human constructions (or legal technologies) that perform the function of ordering and organizing politics. Being included in a Western rights regime, even if it makes claims to universal human rights, immediately places the naming power in the hands of the colonizers. What place do rights based on the

dictates of The Dreaming or ancestral propriety have in the western model? Can these rights regimes co-exist?

Dodson advocates a plurality of rights regimes, including indigenous models, but also rights that apply to robots and other non-human beings. However, in a chronological version of excess, he believes that the serious discussion of robot rights is premature when so many living, breathing human beings and cultures are being denied their legitimate rights. Robots can have their rights, Dodson argues, but they "should wait in line" (2001, 103). However, indigenous traditions and pluralistic rights regimes may also continue to be a fruitful source for rights strategies for exuberant entities outside the current Western legal structures.

These samples of rhetorical strategies and the forms of resistance we see in rights discourse demonstrate that rights are powerful, but unwieldy tools for legitimizing political subjects and policing boundaries of community norms. Rights are not trump cards, they don't *always* extend freedoms, and have no intrinsic power outside their contextualized mobilizations (Milner and Goldberg-Hiller 2002). The various modes of neuropolitics, including legal argumentation, moral philosophy, and community and cultural norm policing are contained within a rights discourse framework. Strategic use of rights and personhood will continue to define neuropolitics in practice.

Conclusion: An Ethic of Hospitality

Through the lens of diversity, subjectivity, and rights, we've been able to see how fundamental issues of politics and power are reconstituted in response to advances in neuroscience and a neurocentric worldview. These three reemerge as powerful discursive strategies and techniques in politics of the self.

Diversity not only looks different under the gaze of the molecularized, medicalized, objectified eye, but the life at forced perspectives and mingling of scales recasts how we categorize difference. The topsy-turvy world of high-resolution diversity disrupts hierarchies and throws power dynamics into flux.

Through the story of Michael Chorost and his vision for deaf culture in an age of programmable hearing, we see an example of how political subjectivity and identity are up for grabs. And while many new choices for how we sense and experience the world are available, the quest for a measure of personal freedom in a society of control makes for inherent and unpredictable political fissures.

And finally, the language of rights remains a pervasive frame for how we think about new or recast subjectivities and their participation in the political process. Invocations of rights occurs at many turns in a political dissensus, but rights are a tricky and risky strategy entailing acceptance of a wider framework of assumptions and demands, not always meshing with the intent of the rights claimants, or even of our changing worldviews.

Discourses and discursive strategies can be an abstract way of getting at the very meaty and embodied neuropowers that matter to people. Discursive spaces are constituted and occupied by willful agents with minds, bodies, feelings, and agendas. Temple Grandin and Michael Chorost aren't just examples of neuropolitical subjects, they are real people who's lives have been and will continue to be changed by the trajectories of neuropolitics and the mobilizations of neuropower, as will we all. But, as we've seen with the *Wikileaks* spectacle of 2010-2011, the focus on and targeting of an individual, Julian Assange, obfuscates the fundamental social and political issues and power dynamics. An analysis of the discursive spaces of transparency,

democracy, and participation in a digital age would be more informative and useful. That is the rationale that has driven the approach in this chapter.

What the analysis of diversity, subjectivity, and rights show is that for neuropolitics to become a force of positive political change, it should include what Shapiro calls an "ethic of hospitality." It "requires hospitality to one's collective self, based on a recognition that every society, every so-called nation-state, contains disjointed presences, forms of life, biological trajectories, kinds of persons that the languages of national and civilizational solidarity will exclude" (Shapiro 1998, 698).

If we can end hearing loss as we know it, are we losing a unique and beautiful sense-culture, or are new auditory technologies introducing a range of possible new and wonderful experiences into the world? Yes, we'd like to eliminate Alzheimer's disease, but if we can "cure" autism, should we? Or anxiety? Or depression? We must be careful with our decisions, and careful not to eliminate the wealth of diversity we've built up in our history. Just because we can now objectify the subjective, and see what normal, or even most optimized, looks like statistically, doesn't mean we are beholden to it, or should be beholden to it. It is this recognition, and openness to difference and to alternative ways of experiencing consciousness that will make a progressive neuropolitics worth fighting for.

Hospitality requires a measure of tolerance and humility, and only with these can we expect to move beyond our *embarrassing* failings as humans without losing our humanity. We can then move toward the exuberant mode of personal and social experimentation necessary for our times of accelerating change in the neurocentric age. But that road will not be easy, and given the forces we will explore in the following chapters, it may not even be likely.

Chapter 3: Fear, Security, Speed: The Threat of the Ungovernable Mind

In the previous chapter, I discussed how the discourses of identity, subjectivity, and rights were being re-imagined in response to advances in brain sciences. These re-imaginings are laying the foundation for a new kind of political struggle that involves the creation and utilization of new knowledge-powers emerging from neural imaging, sensory prosthetics, and the quantification of the mind. As part of the overall exploration of the neurocentric governmentality that is manifesting itself in politics today, I turn now to the domain of security, surveillance, and policing. Security and surveillance make for clear and present demonstrations of neuropower, and point toward areas where intervention is needed to avoid its more repressive tendencies.

Three Stories of Fear and Folly

Fear of a box: The Schrammie

FIGURE 6: THE SCHRAMMIE

A package arrives at a state office in Washington. Addressed to Dept of Corrections Secretary Harold Clark in handwritten scrawl, the package contains no return address but does have strange stains that make it appear something is leaking inside. A mailroom worker sees these telltale signs of a

"suspicious" package and notifies his superiors, setting in motion a full-fledged bomb-scare, including the evacuation of all 350 workers in the building and activating the Washington State Bomb Squad.[22]

After several tense hours, a bomb technician emerges from the mailroom with the news—the package did not contain a bomb, but rather a bobblehead doll of local TV commentator Ken Schramm. Apparently, as everyone came to find out, as a publicity stunt for his opinion segment on the news, Schramm sends a bobble-head doll of himself, aka a "Schrammie," to local officials, businesses, and others deemed worthy of a dubious distinction for dereliction of duties or otherwise unethical behavior. Harold Clark was sent a "Schrammie" after the announcement that 83 felons were to be released early from Washington jails. The crisis of enclosures, it seems, comes with many unintended consequences.

Fear of a sweatshirt: Socket-to-me

FIGURE 7: SOCKET TO ME [23]

Star Simpson, an MIT student from Kihei, Hawai'i went to meet her boyfriend at Logan International Airport in Boston. She wore a black, hooded sweatshirt sporting a computer circuit board, some connecting wires, and the words "socket-to-me" and "Course VI" on the back-- referring to her electrical engineering and computer science major at MIT. However, this bit of creative

school pride, made for career day, carried a different meaning for the MA Port Authority staffer manning the Information booth as Simpson approached. Simpson asked the guard about her boyfriend's flight arrival time. Suspicious that the student's sweatshirt might be some sort of explosive device, the staffer initiated another cascading emergency response, leading to Simpson's apprehension and arrest for disturbing the peace and the possession of a "hoax device." While a harrowing public arrest might seem excessive to most, Scott Pare of the MA State Police clearly warned of the other high-stakes alternative, saying Simpson was "lucky she followed the instructions [of the arresting officers] or deadly force would have been used. She's lucky to be in a cell as opposed to a morgue" (Associated Press 2007b). Lucky, for sure, because the guns carried by the MA State Police are certainly not hoax devices.

Fear of a fax: "The Countdown Begins"
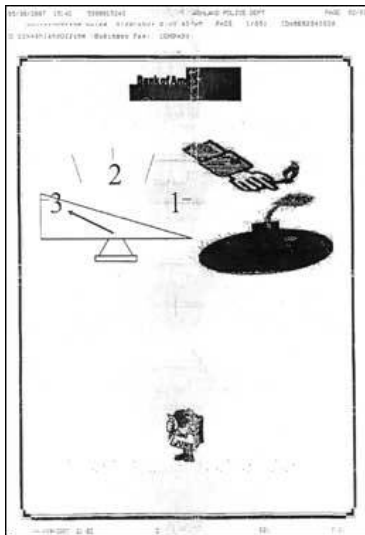
FIGURE 8: THE COUNTDOWN BEGINS [24]

A bank manager in Ashland, MA pulls a strange fax from the machine. On the fax is an image of a bomb, and a hand just about to light the fuse. The manager, frightened by the suspicious message dutifully calls the police. You

can imagine what happens next—the bank and all the stores in the mall, including a day care center, are immediately evacuated. Apparently, the fax was sent by the bank's corporate office to raise awareness and build excitement for the upcoming "Small Business Commitment Week" and related events. This excitement builder message, unfortunately, was garbled by a malfunctioning fax at the corporate office. It should have looked like this:

FIGURE 9: SMALL BUSINESS COMMITMENT WEEK [25]

While many of the local businesses that were affected by the evacuation called for the bank to pay for lost revenue and emergency service costs, similar to what was done after the "Aqua Teen Hunger Force" campaign that shut down much of Boston in 2007,[26] Ashland Police Chief Scott Rohmer disagreed. Supporting the bank manager's response, Rohmer believed "it was reasonable to assume there was a threat, based on what they saw on the fax" (Drake 2007).

Fear and folly

While these three stories certainly embody Samuel Taylor Coleridge's dictum: "in politics, what begins in fear usually ends up in folly," the

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governmentality emerging from the security mindset of the state as it tries to maintain control in these volatile and rapidly changing times is often far from folly. These stories, and the scores like them, are indicative of limitations in our individual and social capacities to analyze and respond to risk in an appropriate manner. It seems we are losing the tempering functions of governance at multiple layers do to the increase in ambiguity and acceleration of speed.

The neocortex is being overwhelmed by fear signals coming from the limbic systems and amygdala. Police officers and emergency responders are mimicking the panic of overreacting citizens. Overzealous police officers are sending city-wide and nation-wide emergency-response systems into action. There seem to be fewer and less capable institutional and psychological tempering strategies to the hair-trigger, state of emergency mindset that pervades society today. These stories represent the limitations of our cognitive and decision-making skills in a high-risk, high-stakes state of almost constant emergency. They demonstrate a shift in the intensity of security and surveillance by states and their citizens in response to accelerating change, collapse of "safe distances," and the amplified threat of super-empowered angry individuals (Freidman 1998). Neurocentric governance is being driven by this pervasive sensitivity to risk, an exaggerated emphasis on security, and potentially repressive affinity for prediction and preemption. The examples were chosen not for their shock value or death counts, but to illustrate the million seen and unseen costs of social, economic, and political fear.

While fear is the gateway drug, terror is the addiction, with abuses and invasions as the seemingly predetermined outcomes. This chapter examines the three neuropowers that are constituted and reproduced by a governmentality concerned with security in an age of accelerating change

and amplified threats. These neuropowers are: treating similarities as equalities, mental surveillance, and prediction and preemption of behavior.

Life at Amygdala Speed: Treating Similarities as Equalities

The phrase "to treat similarities as if they were equalities" comes directly from political theorist William Connolly's *Neuropolitics* (2002). In his genealogy of ideas about the "nature" of the mind, Connolly cites Nietzsche's critique of the human tendency to create broad, oversimplified categorical responses to stimuli. For Nietzsche this is an illogical strategy because it masks differences that are essential to thought—although admitting that these categorizations make formal logic possible. These strategies give us quick and ready reactions to the novel. But, neuroethicist Erik Parens rightly points out, "the problem with readily available responses is that, by definition, they do not require thinking" (2004). Categories habituate us against consideration of things in their particular and idiosyncratic fullness. These habits of thought "become corporally encoded into patterns of perception and cultural vocabulary," as Connolly observes, as well as into the social and political technologies that reproduce these habits over time and across space (2002, 52-53).

The models we build around these habits are, of course, necessary to some degree for decisions to be made and action to take place. These "efficiencies" in thinking and perceiving save us from the curse of Borges' famous character Funes, the Memorious. Funes' perfect recording memory meant that the world was written anew at every instant of perception. A dog looking at his master is not the same dog that turns to look out the window. Or, in other words, there was no need for the efficiencies of categories when each and every moment has its own category or unique identity.

And, in some ways, this is true—we are not the exact same being from moment to moment. We change in small and often imperceptible ways. But these changes don't always carry information, i.e. they aren't differences that make a difference, as Bateson defined information (1972, 457). They make no difference to human existence and the process of meaning-making.

There is a continuum of response. On one extreme pole there is this sort of radical particularity and unique identifiability. On the other pole, we have the broad generalizations of perception that help us elide actual encounters with the novel. These generalizations help avoid encountering the new, and therefore the trouble of actual thinking. Between these two poles, society today seems to fall more toward the latter than the former. In other words, we are looking for efficiencies in thinking to help us keep up with life at high speeds and with overwhelming information streams. But building these efficiencies into every layer of the social, economic, and political systems without adequate checks and balances (or brakes) means that deliberation, contemplation, or even simple appraisal of situations are lost to the blur.

Speed and fear are initiating a fragmentation and re-distribution of the sensible world. The response strategy of treating similarities as equalities merely amplifies the dilemma, which is: try as we might to use our well-rehearsed habits of perception, or return to the unearned comforts of fundamentalisms and absolutes, the speed of life combined with information abundance is forcing people into new encounters and new emotional landscapes that they might not be adequately prepared for as individuals, or as populations.

VUCA for all

The military works at the front lines of the speed and security. At the U.S. Army War College in Carlisle, PA they have come to use the acronym VUCA to describe the grand theater of operations in which their officers will be trying to lead (Pang 2007). VUCA stands for volatility, uncertainty, complexity, and ambiguity. *Volatility* reflects the massive amount of change that has and can occur in a very short period of time, making improvisation and reassessment vital skills. Novelty and incomplete information makes *uncertainty* an irreducible part of decision-making as well. Distributed and multi-functional agents in an information rich context create enormous amounts of *complexity*. And finally, fluid identities, fragmented information, and acceleration of change lead to increased *ambiguity*.

VUCA captures this sense of the ground shifting under our feet. At the War College, more time is spent training on how to make decisions in a VUCA environment than looking for ways to reduce these complicating factors. This way of thinking has become so ingrained at the Army War College that internally it is often referred to as VUCA University (Johansen 2007, 2). The VUCA approach reflects what political theorist Michael Dillon calls "corporeal phenomenology" (2003). This is a military mindset, related to the so-called Revolution in Military Affairs (RMA), that Dillon argues embraces the view of military response as a function of information and code:

> any (military) body must be endlessly mutable, and that the
> way to command this mutability is to develop a strategic
> virtuosity in the employment of information in order to
> refashion (military) bodies-in-formation according to any and
> every eventuality (2003, 129).

But the VUCA framework doesn't just apply to theaters of operations in war zones. From the boardroom to the domestic abode, VUCA is coming to define reality for people in their everyday lives. Maintaining situational awareness and cultivating the capacity to make wise decisions in the face of informational ambiguity is becoming a necessary skill-set for almost every individual in modern society. As sociologist Engin Isin observes, this feedback loop between complexity and the awareness of complexity "creates a situation where we have to make decisions and we are held responsible for those decisions that we were forced to make without adequate knowledge of the situation" (2004, 218). As the three stories of emergency overreaction attest, our cognitive capacities and our meta-cognitive systems, i.e. our formal systems of governance, have not evolved with the same speed as our VUCA world. Overcoming maladaptive biological, cultural, and institutional legacies is extremely difficult, and made more difficult when domains of life are accelerating at different rates and when the long-term stakes of our decisions are more significant.

Hijacking the amygdala

One of our most important *legacy* brain regions essential to understanding how we react to potentially dangerous or emotionally heightened situations is the amygdala. The amygdalae are a pair of neuronal clusters located deep within the brain in the limbic system, near the hippocampus in the medial temporal lobes. They are roughly almond shaped, and take their name, courtesy of anatomist K.F. Burdach, from the Greek word for almonds (Whalen and Phelps 2009, xi).

Historically, the amygdala has been associated with fear and fear conditioning. Recent neuroscience, however, has shown the amygdala to be significantly involved in not only fear and anger, but also plays a leading role in overall memory formation (especially the emotional intensities associated

with memories), reward conditioning, and several of the higher (and slower) brain functions including attention, perception, and social behavior (LeDoux and Schiller 2009, 43-47).

The amygdala relies on input from all the senses, but is particularly attuned to information coming from the visual system, making it the consummate "danger detector" in the brain (Freese and Amaral 2009). It is a "quick and dirty" brain region that often acts below our conscious perception. As Connolly notes in his discussion of the importance of the unconscious neurological functions that color perception, the amygdala "participates in a system that generates rapid, coarse judgments in dangerous situations operating below the capacity of conscious assessment and feeling" (2002, 90). The amygdala, Connolly continues, "both influences conduct on its own, and bumps intensities into conscious thinking and judgment" (2002, 91).

We feel the result of our amygdala working when we recoil from a garden hose we first perceive as a snake, or when we sit up in bed, our heart racing from hearing a "bump in the night," or even when we take evasive action while driving a split second before we consciously realize the danger ahead. The amygdala works fast because it has to—it evolved to deal with temporary states of emergency and existential threats. It is a sense and react organ—taking action first and letting the neocortex ask questions later. It is designed to see almost everything as a potential threat. Failing to see a threat when there is one is more evolutionarily disadvantageous to animals than seeing a threat where there is NOT one.

What's important for this discussion is the role of the amygdala in many aspects of "affective information processing" (Whalen and Phelps 2009, xi). Accelerating change, the compression of distance, including especially the localization of a global risk pool, means that the amygdala is processing more emotionally charged encounters than ever before, and trying to assess

danger in a globalized landscape of physical, psychological, and even virtual threat. For an organ that has evolved to seek out potential dangers, the hyperactive and precarious world we live in today (and will be living in for the foreseeable future) means that the amygdala becomes a central character in the neuropolitical drama.

Speed and global reach seem to have stretched and stressed the biologically typical functioning of the amygdala. This has caused increased fear response—often by treating too many differences as similarities, and similarities as equals. Psychologist Daniel Goleman, in his book *Emotional Intelligence*, introduces the concept of "amygdala hijacking" to describe this tendency of ambient minor threats to be read as urgent and in need of an immediate and strong response (2005, 14-24). The amygdala, "if it perceives an emotional emergency, can take over the rest of the brain before the neocortex (the thinking brain) has had time to analyze the signals coming in and decide what to do. That takes a long time in brain time. The amygdala in the meantime has decided" (quoted in Hughes, n.d.). An amygdala hijack has three main components: 1. An initially strong emotional response, 2. A response that is quick and happens before the thinking brain has time to process, and 3. A period or realization of regret that the emotional response was inappropriate or out of bounds for the situation.

We've all had these experiences, but if a recent account of the cultural zeitgeist in the U.S. is indicative, it seems the frequency and scale of these amygdala hijackings are on the rise. In USC sociologist Barry Glassner's *Culture of Fear* (2000), he chronicles how fear is constituted and perpetuated in American society. One of the major culprits of increased fear is the disproportionate coverage of tragedies, catastrophes, and violence around the world, streaming constantly into our living rooms and on the screens that fill our field of vision every day. These traumatic events, either in our own

lives or ones that we internalize from events elsewhere, create very sticky and emotionally resonant memories.

These memories can be debilitating to individuals, especially one's who are living with trauma from war, violence, or their job. Psychiatrists have been working on techniques to ameliorate the impact of traumatic memories, to help individuals to lighten the weight of memory, or to prevent the installation of phobias. Overriding fear responses in the brain is difficult, and some have suggested the use of drugs such as beta-blockers, which have been shown to reduce the intensity of memories, by front-line emergency response workers to keep the amygdala from "underlining" particular memories (Johnson 2004, 63-64). These "morning-after" pills for traumatic events might become a breakfast supplement if scenarios of climate disasters, global economic collapse, or pandemic disease come to pass.

These conscious memories, or even the unconscious memory traces left by the constant bombardment with emotionally charged images of past, present, or even future trauma, create subterranean ripples in our mental processes. Neuropower surfs on these ripples of fear and dread. Fear is able to blind, distract, or incapacitate. Fear plays tricks on the mind. High anxiety is associated with those forces that seek to play with our memories, or institute an "era of forced forgetting" in social anthropologist Paul Connerton's phrase (1992, 12). Of course, not all fear is bad and fear is a necessary part of life, but the re-calibration of fear becomes a method of intervention and contestation in the practice of neuropolitics.

Neuropolitical life today involves an amplified sense of risk along with a reduced feeling of distance from risk. This distance is what allows our amygdala to resist sending frantic signals the neocortex at every turn. Our ambient feelings of threat and uncertainty lurking all around us has lead to a general sense of anxiety and unease. Glassner's book attempts to identify the

"vendors of our fears," because "immense power and money await those who tap into our moral insecurities and supply us with symbolic substitutes" (2000, xxxviii). People need a fully activated neocortex to participate effectively in politics, but as Timothy Leary observed in his take on neuropolitics, "no one listens or thinks in a fear society" (1977, 62). To frame this as a neuropolitical issue, we might say fear transfers governance of the mind to forces both in the shadow of individual consciousness, such as the amygdala, and over the horizon of individual consciousness, such as state and corporate powers.

The Threat of the Ungovernable Mind: Surveillance and Preemption

Governments, corporations, and entrenched powers are navigating a complex field of threats and uncertainties. And they are not navigating those landmines simply for their own survival, but have the added responsibility to protect their constituents and citizens from existential threats as well. Environmental disasters, resource scarcity, economic insecurity, energy disruptions, terrorist attacks, pandemic diseases, and even moral panics are now squarely within the purview of governing bodies. A shift in governmentality has and is continuing to take place that stakes its legitimacy on the protection offered to citizens from existential risks and major disruptions—even if those risks have been directly or indirectly manufactured by the governing bodies themselves. The U.S. Department of Homeland Security, an agency that sprung forth from the 21st century security worldview, captures this sensibility in its latest strategic plan, "we shall identify, defeat, and mitigate threats to the safety of the American people. We will constantly guard against threats, hazards, or other dangers that threaten our Nation and our way of life" (2008).

Yet many governments aren't looking to slow the pace of change in order to get a better handle on risks. In fact, innovation and change isn't happening fast enough in some quarters. For example, frustrated by the slow progress of new pharmaceuticals coming to market, the throttling of research dollars in tight economic times, and the now decade and a half long decline in pharmaceutical productivity, the U.S. has decided to kick-start drug development through the creation of the "National Center for Advancing Translational Sciences," with an opening budget of a billion dollars (Harris 2011). Change is scary, but lack of growth is often even scarier to political figures.

A parallel, but divergent dynamic is at play as well. While citizens expect their governments to carry more of the burdens of protection, these same governments are shifting many of the burden of risks to individuals. State theorist Nikolas Rose tracks developments in the governmentality of biopolitics that are forcing individuals "to secure their own security" (2006, 4). Food inspection, disease tracking, border control, health care, home safety, and many other aspects of our risk environment are being left to cash strapped state and local governments, or to individuals themselves, to manage. Uncertainty surrounds roles and responsibilities for security.

The empowerment of the individual and shifting landscape of roles and responsibilities disrupts many established power dynamics, making governance even more difficult. But governments and agents "governing through risk," as Engin Isin puts it (2004), are actively involved in the funding and incubation of new knowledge regimes meant to manage and control the risks generated by the super-empowerment of individuals, small groups, and other state and non-state actors all performing on the global stage. Part of this new knowledge-power involved peering into the minds of citizens.

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Mental surveillance

Networked individuals and small groups have leveraged opportunities to observe and expose the actions of governments, corporations, organizations, and each other. *Wikileaks*,[27] a website which provides a platform for citizens to disseminate secret documents and information, is but one well-known example of how the barriers to transparency are being lowered. However, the infrastructure and sophistication needed to perform large-scale mental surveillance—capacities that are still only in formation right now—are still held by states and large corporations. These entities have the resources and the legal or quasi-legal mandate to engage in practices that will drive the growth of mental surveillance. As was introduced in the opening chapter of the dissertation, the mental surveillance techniques that are most relevant to the mobilizations of neuropower are direct brain imaging and the analysis of our extended minds as represented in our networked, digital behavioral trails and our public and even private digital expressions. These processes offer different windows into the same "black box"—one through our private thoughts, and one through our outward behaviors and words.

Direct Observation

Direct neural imaging has been discussed in previous chapters—particularly in the context of clinical neuroimaging and the formation of personal identity. However, PET scans, fMRI, EEGs, and other techniques for imaging a working brain carry different implications regarding surveillance in the security state. Throughout this chapter, we'll see how information pulled directly from the blood flows and electro-chemical signals of the brain are being used as tools for law enforcement, crime prevention, counter-terrorism, and even enhancement of concentration and attention. While the technologies are not advanced enough to confirm the paranoid fears of those

who think the government has mind control machines, neuroethics and the concept of cognitive liberty are becoming mainstream political issues that must be seriously addressed by our policy-makers and the general public today.

The technical capacity to tell what a person is thinking just by looking at a brain scan is drawing closer. For example, by placing a series of microelectrodes on the speech centers of the brain, researchers at the University of Utah have been able to pick out what word a patient is thinking. Each word has a particular neural pattern, and researchers were able to match that pattern to the right word 86% of the time. (Seigel 2010). This research is highly invasive right now—as the electrodes are placed directly on the brain, but higher density electrode arrays and less invasive techniques are in the works. The next step, says Dr. Bradley Greger, head of the project, is to "make the grid bigger, have more electrodes and get a tremendous amount of data out of the brain, which probably means more words and better accuracy" (Seigel 2010).

DARPA and other military agencies are highly interested in "mind reading" technology, not only for interrogation and lie detection purposes, but also for increasing communication options for soldiers where voice, text, or other signals are inadequate or dangerous. As Jonathan Moreno points out in his book *Mind Wars: Brain Research and National Defense,* "philosophical discussions of mind reading could be rendered academic if certain DARPA projects are even modestly successful (Moreno 2006, 98).

A close look at the types of research funding and support that is going into neuro and cognitive science from the military shows that governments around the world are serious about the brain as a theater of military intelligence and personnel enhancement (Moreno 2006, Gusterson 2007). Of particular interest in today's counter-terrorism mindset is the ability to peer

inside an enemy's mind. The Air Force's 711th Human Performance Wing has been one of many U.S. military research arms that have been developing technologies and tactics to read, disrupt, or control enemy minds. The 711th has released a call for proposals to develop technologies "to anticipate, find, fix, track, identify, characterize human intent and physiological status anywhere and at anytime" (Schactman 2010).

Optimizing friendly minds are also within the purview of military interest. Moreno gives a litany of DARPA projects that he condenses within an overall strategy to "combine into a single system techniques for measuring brain activity and wirelessly transmit all that information to a computer that will interpret the information for various purposes" (Moreno 2006, 101). These purposes include monitoring stress levels, attention, and especially important in the VUCA context, a soldier or agent's cognitive load. These feedback tools have been central to the conceptualization and prototyping of so-called augmented cognition, or "augcog" technologies.[28] These technologies not only monitor cognitive load, but also adapt the user's informational interface to an optimal level. In other words, if a user is overwhelmed or highly stressed, the screen will filter out windows, dashboards, or other elements of the visual field, leaving only the most important and pressing information. These kind of adaptive interfaces based on neurofeedback are finding their way into other domains including stock trading (Djajadiningrat et al. 2009), knowledge work (Hirshfield et al. 2009), and potentially almost every endeavor that requires decision-making in ambiguous and high stress situations.

The courts are on the front lines of decision-making in novel situations as well. Courts often see social changes and new technologies well before the legislative or executive branch have taken them up. This includes neurotechnology. In the coming years, we can expect to see an explosion of neural imaging technologies and neuroscientific evidence introduced in

almost every kind of case from criminal to juvenile and family law (Garland 2004, Zeki and Goodenough 2006, Gazzaniga 2005). UPENN psychiatrist David Langleben has conducted neural imaging studies showing that "cognitive differences between deception and truth have neural correlates detectable by fMRI" (in Moreno, 2006, 103). Only a few cases in the U.S. have seen brain scan lie detection or 'neural correlates of prior knowledge' evidence been introduced, and so far no judge in the U.S. has allowed this evidence into trial, but the story is different internationally.

In a recent murder case in India, the "Brain Electrical Oscillations Signature" (BEOS) test, developed by neuroscientist Champadi Raman Mukundan, was administered to the prime suspect. This suspect, Aditi Sharma, was later convicted due in no small part to the evidence from the BEOS fMRI test showing she had "prior knowledge" of the details of the killing that no one else other than the killer could have. A Wired UK story about the case describes the importance of the brain scan:

> Evidence from the scan took up almost ten pages of the judge's ruling when a year later, on June 12, 2008, he jailed Sharma for life – making her the first person in the world reported to be convicted of murder based on evidence that included a brain scan. "I am innocent and have not committed any crime," she implored Phansalkar-Joshi before he sentenced her. Even he, her lawyer said, had trouble believing that this small, calm, softly spoken student, from a respectable, middle-class family, was capable of killing (Saini 2009).

FMRI lie detection is highly controversial, however. Most neuroscientists and legal experts believe that the level of sophistication of these technologies are insufficient to be deemed reliable and trustworthy. No person's lie should hang in the balance given the lack of verification of these techniques. Nevertheless, these warnings have not stopped many entrepreneurs from developing and aggressively marketing their brain-based lie detection

products to lawyers and law enforcement agencies. The marketing appeal relies on that very seductive assumption that we can peer inside the heads of people—especially witnesses, suspects, and other key figures in the world of law and order. As I discussed in the previous chapter, the appeal of "objective" measures lies in our desire to minimize idiosyncratic biases and human limitations. This desire is strongest when the stakes are highest.

But it doesn't take expensive imaging technologies to read someone's mind—at least some of their attempts at deception. Paul Ekman at UCSF has spent his career studying facial and behavioral clues of people as they deceive. He's been training others to do so as well, with remarkable success. He claims to have achieved 80% accuracy in detecting when someone is lying (Moreno 2006, 106). TSA agents and others are learning these kinds of techniques as well, so large machines will not be the first or only way that mental surveillance will take place. Moreover, not all mental surveillance requires neural imaging technologies, or even direct access to a body. A rather large and useful window into our minds comes from the analysis of the products of our distributed cognition—the digital trails and expressions we leave behind us on the web and other networks.

Scanning the networked mind

It seems that today many people feel little need to internalize factual information, as it can be accessed immediately from networked mobile devices. But people are also externalizing their thoughts, feelings, and memories into digital networks. This creates a more permeable and fluid barrier between our minds, our devices, and our networks, creating a new relationship to privacy and shifting our locus of cognition. As British scientist and commentator Susan Greenfield notes in her critique of this cognitive offloading, "it is most likely that the isolated, private world of the individual imagination as we know it could soon be as obsolete as the ability of our

ancestors to recite tribal sagas from aural memory is today" (Greenfield 2004, 167).

Many social network companies are looking to capitalize on the passing of the private mind. Marketers are especially interested in finding a way to access reliable neurological patterns of consumer desire. A cottage industry of web behavioral tracking has emerged that use browser cookies,[29] social media tools that indicate user preferences (such as "like," "fan," or "digg"), and network analysis to create taste and behavioral profiles for individual, groups, and fine-grained demographic categories.

While creating enormous privacy concerns,[30] these tools provide much more nuanced pictures of consumer desires and affinities than market research, surveys, or focus groups can hope to replicate. Social network research offers the promise of understanding consumer desire in much more targeted and cost-effective ways for marketers. As touted on the website of the social network research firm Colligent, the company "tracks 145 million active consumers from online social networks, covering more than half of the US adult population. Affinities to 37,500 brands, media, and entertainment are tracked" (colligent.com).

Mobile devices and ubiquitous closed-circuit surveillance cameras also offer another avenue for creating group mental profiles through behavioral mapping. Millions use to applications like foursquare, Gowalla, and Facebook Places to "check-in" or otherwise publicize their daily travels. This information is a marketers dream for gauging the effect of location-based marketing and advertising. In addition, facial recognition software and surveillance camera footage can be combined for innovative tracking and crime fighting techniques, such as detecting a "questionable observer" who return to the scene of the crime (Sandhana 2011).

This kind of marketing research described above generally focuses on user behavior, preferences, and affinities (i.e. the consumer mind) at a collective level, however new applications are being developed to help make useful inferences about individual minds by similar means of monitoring web clicks, typing patterns, and speed of information consumption. One example is Microsoft's "BusyBody."

We've all had those moments when a great idea or train of thought is lost due to an untimely interruption. Probably the most famous in history is Samuel Taylor Coleridge being interrupted in the middle of composing Kubla Khan by "a person from Porlock."[31] A budding Coleridge of today, however, would probably not even advance to the moment of decreeing a pleasure dome before a distraction would wake the writer from his or her creative state.[32] This need creates an opportunity space for designers and programmers.

BusyBody is a prototype computer application developed to help users combat that bane of the information age—the constant interruption, as well as help ameliorate it's sister affliction—continuous partial attention (Stone, n.d.) As the Microsoft researchers who programmed BusyBody describe it, it is "a system that intermittently asks users to assess their perceived interruptability during a training phase and that builds decision-theoretic models with the ability to predict the cost of interrupting the user" (Horvitz, Koch, and Apacible 2004). By learning user patterns, and predicting the levels of concentration and focus needed to accomplish a given task, the program can respond automatically in real-time to adapt a user's interface to their particular cognitive needs. These "mind-reading" tools will be essential components of many high-stress, information-rich environments, and will provide a wealth of data for proxy surveillance applications.

And finally, "mind-reading" can be done not only through physical and virtual deeds, but through actual words as well. Semantic analysis of our

electronically captured and stored textual and rhetorical expressions provides a portal into our habits of thought and even our emotional states. Our formal writing and the minutiae of our everyday expressions and "status messages" on Facebook and Twitter can be analyzed for psychological profiling and identification.

Psychologist J.W. Pennebaker at the University of Texas has spent much of his career looking at how our pattern of word use indicates a distinct and changing mental state. Using his "linguistic inquiry and word count" (LIWC) technique, he and his colleagues have shown that poets who used first person pronouns and referred to themselves relatively more than to others were more likely to have committed suicide than poets who did not (Stirman and Pennebaker 2001). Extending these insights, Pennebaker and others have created a series of psychological and emotional assessment tools that rely on analysis of subject speech and writing (Rude, Gortner, and Pennebaker 2004; Pennebaker, Slatcher, and Chung 2004; Pennebaker, Mehl, and Niederhoffer 2003). Other popular web applications, like TweetPsych (tweetpsych.com), do algorithmic analysis of personal electronic expressions, adding a layer of real-time identity feedback and insight into psychological and emotional states that has not existed before.

These tools are not only useful for describing our psychological states, but are being used to predict behaviors and preempt unwanted acts. DARPA, for example, has initiated a research program elegantly dubbed the "Integrated System for Emotional State Recognition for the Enhancement of Human Potential and Detection of Criminal Intent" that uses speech patterns, behaviors, gestures, facial expressions, chemosignals (such as pheromones of fear), and thermal imaging (Lynch 2003). This search for prediction and preemption capability is directed toward the ultimate payoff for many forms of surveillance—to detect and thwart threats before they happen—and

drives the formation of a very potent and politically fraught form of neuropower.

We can imagine a future in which these data aggregators and analysis tools will know more about us than we know about ourselves. This kind of data must be handled carefully and transparently if we are to maintain a measure of political self-determination and balance of power. Having governments, corporations, or other powers a step ahead of its people is a recipe for control and repression.

Prediction and preemption

The new windows of the mind are not only opening up new *spaces* of cognitive, emotional, and behavioral surveillance, but also expanding the *times* and tactics of intervention.[33] Stanford law professor and neuroethicist Henry Greely considers the prediction of individual psychological conditions and behaviors to be one of the most socially and legally transformational outcomes of advances in neuroscience (in Garland 2004, 114-156). Any tool that can provide predictive capacity, even the unverified semblance of predictive capacity, is coveted in our society. Standardized tests to predict scholarly achievement, dating algorithms for perfect mate matching, psychological tests, market research, even social modeling and simulation programs are just a few examples of the myriad ways we seek to see and foresee human activities.

The allure of prediction is tied to our desire for control, a desire that precedes neuroscience but is conditioned in new ways by it. Neuroscience gives this desire for control new spaces of possibility within the brain and out into the extended mind, and puts control levers on what was the previously unseen and unmodifiable. What are the conditions of possibility

that exist today that bring neuroscience into the conversation about control? In other words, why now?

A state of emergency

Many political observers believe that most global powers today, especially the United States, can be described as a "security state" (Stuart 2008). Placing the origins after WWII and associated with the passing of the National Security Act of 1947, the security state governmentality reflects and institutionalizes the core missions of the CIA and Department of Defense within the structure of the entire government (Hogan 2000). A security state has several distinct features that define its particular flavor of governmentality, including the primacy of the military as the highest authority, the dominance of the military-industrial complex in political-economic decision-making, an obsession with enemies (both foreign and "home grown") and the need for total destruction of those enemies, and the belief that secrecy, exceptionalism, and limitations on speech and political participation are necessary for continued survival of the state (Nelson-Pallmeyer 1992).

This kind of governmentality reflects the on-going shift from a "society of discipline" to a "society of control,"[34] and has also been described as the "nervous system" by anthropologist Michael Taussig (1991). Echoing Walter Benjamin's observation that "the tradition of the oppressed teaches us that 'the state of emergency' in which we live is not the exception but the rule, Taussig argues that the "nervous system" of a risk-oriented, security and surveillance state exists in a constant state of readiness, requiring constant feedback from the body politic in order to immediately sense any disturbance or threat (1991, 2-10).

Italian political theorist Giorgio Agamben sees this high alert mode as default position of governance today, noting that this "permanent state of emergency…has become one of the essential practices of contemporary states, including so-called democratic ones" (2005, 2). This has led to a permanent state of exception that allows leaders to indefinitely suspend certain laws and legal procedures that are deemed detrimental to the overriding necessity of maintaining vital security and stability.

The peculiar "state of emergency" mindset that came along with the administration of George W. Bush[35] is one that allowed for the indefinite detention of and the preemptive attacks on our enemies (whether nations or networks). The USA PATRIOT Act allows for the incarceration of "enemy combatants," an appellation determined by the executive that can be applied to a wide range of hostile enemies on the battlefield or any other agent deemed to be an active threat to the interests of the United States, again as defined by the executive (Whitehead and Aden 2002).

Combine the expansions of power legalized by the PATRIOT Act along with the so-called Bush Doctrine (i.e. preemptive war), and we have a radical shift in U.S. foreign and domestic policy—one that changes the practice of diplomacy, military intervention, and the oversight of executive power. "The whole point of the nervous system," Taussig argues, "is its always being a jump ahead" (1991, 2). The political and legal systems in the United States have begun to re-orient themselves around this perceived responsibility to be a "jump ahead. " Prediction and preemption of violent or even threatening acts becomes a vital capacity of power, one that goes beyond, or below, an international stage, and applied even to small groups and individuals.

Super-empowerment

A line of argument in the discourse on globalization says that the digital, networked infrastructure has allowed individuals to "scale-up" their power and influence with rapid speed and extended reach. Profound or pedantic personal observations on life can be 'broadcast' to the world instantly, overnight sensations come and go on the video site YouTube, and world events are streamed and watched live by millions around the globe. We are technologically connected, ambiently aware, and never far from the informational and even physical resources we need to accomplish our chosen missions—from the mundane to the grandiose.

Analysts and commentators on global terrorism have observed that these same technologies, networks, and lowered barriers to access that have allowed individuals to share their talents and amplify their powers, have also provided the infrastructure to 'scale-up' an individual's capacity for spreading hatred, destruction, and mayhem both far and wide. NY Times columnist Thomas Friedman calls those who use the affordances of globalization and networked technologies for violence, "super-empowered angry individuals," who are "angry, wired, and deadly" (Friedman 1998). Similarly, terrorism expert John Robb calls them "global guerillas" and "global entrepreneurs." These individuals "build complex supply chains, benefit from global money flows, travel globally, innovate with technology, and attack shrewdly" (2007, 146). The problem, according to Robb, is that "globalization is quickly layering new skill sets on ancient mind-sets" (2007, 146).

As we know from recent history and current events, however, this incongruity between a pre-modern mind-set and post-modern weaponry is not limited to non-states actors or global networks of terrorists. Many Western leaders, especially have taken Bronze Age notions of "good and evil"

as their guide to exercise their monopoly on "legitimate" violence.[36] Nevertheless, the power of single individuals and very small groups to plan, obtain information and weapons, and execute massively destructive acts has never been greater in human history.

This means a shift in the focus and responsibilities for public protection. It means recognizing (even inventing) threats from individuals both near and far and increasing the breadth and depth of surveillance. It means the extension of the doctrine of preemption beyond threats from rogue or ungovernable nations and applying this doctrine to rogue or ungovernable individuals. It means a governmentality that **sees every human mind as a potential weapon of mass destruction.** It means governance becomes the act of controlling the threat of the ungovernable mind.

Violent Minds

Jared Loughner walked toward the crowd gathered to hear Congresswoman Gabrielle Giffords in Tucson, AZ and opened fire, killing 6 and wounding another 20, including Congresswoman Giffords. Unfortunately, similar mass murders are all too familiar. From Fort Hood, TX to Blacksburg, VA and all around the world, "lone gunmen" have wrought terrible violence. In each case it seems, the warning signs of an imminent "snap" were present and obvious. Tracing these warning signs after the fact does no good for the victims of these crimes, and many in the public are clamoring for more proactive action from the medical system and police forces (Fahrenthold 2011, Allen 2009). While some decry the ease of access to human killing weapons, the political will for any meaningful change to the gun laws in the United States is lacking. However, the government and military do seem willing to put significant resources toward another strategy—the use of data mining, semantic analysis, behavioral patterning, and biometric surveillance to identify, locate, and potentially detain those individuals who appear to be

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ready, willing, and able to commit violent crimes. The kind of safety and security strategy we choose reflects our values as a society, and will constitute the possibility space for the distribution and access to power for citizens today, and in the future.

DARPA (again) has been at the forefront of this research, initiating a program entitled "Anomaly Detection at Multiple Scales" (ADAMS). This program supports research into ways of analyzing the digital trails and behavioral pattern data we actively (and often passively) create about ourselves in order to find tell-tale signatures that indicate hostile intentions (Ackerman 2010). The science has not yet reached the level of advancement to reliably detect anomalous patterns that actually indicate imminent or future violence. However, if the frequency and severity of mass killings by individuals continues or even rises, pressure for preemptive medical or police action will likely increase. This is why *prospective* neuropolitics is desperately needed now, before premature technologies are forced into action by overwhelming political pressures. These growing pressures, potentially released by another public tragedy, could force governments into a position where false positives (intervention on individuals who are NOT actually a threat) will be more tolerable than false negative (non-intervention on individuals who eventually commit violent crimes)—a recipe for injustice and a major threat to freedom.

Precrime

Every proxy indicator for hostile intent (including digital trails) adds another layer of complexity, requiring specialized skills and new literacies, thus slowing down the feedback loop between perception and action. Thus we see a parallel movement. On one hand we have the desire for "going straight to the brain," to be able to directly see what someone is thinking and intending to do. But, "neuroscience reads brains, not minds" as Michael Gazzaniga has

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warned (in Moreno 2006, 109). However dubious and premature this technology is, "the mind" is sought as the ultimate control point.

On the other hand is the expansion of a *precrime governmentality*. As the criminologist Lucia Zedner argues, "we are on the cusp of a shift from a post- to a precrime society, a society in which the possibility of forestalling risks competes with and even takes precedence over responding to wrongs done" (in Mitchell 2010, 239). Precrime is best exemplified in the popular imagination by the major plot device in the film *Minority Report*,[37] released just as the "Bush Doctrine" was being implemented and whose narrative revolves around the use of precognitive viewing evidence to arrest suspects before they commit their crime. This precrime governmentality, as it is seen in actual practice today, relies more on statistical models than psychics, is taking shape in various locations, and citizens are beginning to encounter it in their daily lives (Beam 2011). Soon, however, the predictive capacities of brain imaging will be further employed, starting in airports.

Few places are as functionally and symbolically important for security than airports. Airports carry the "fetish-power of borders" in the evocative phrase of French writer Jean Genet. They are the liminal zones between here and there, home and away. Airport reception areas house that most wonderful human event—the reunion, yet airports are also zones of contagion, terrorism, and surveillance. It is a place of inspection and exception—where we are asked to forgo many of the rights we hold dear outside the boundaries of the airport in order to have those reunions and to conduct the business that makes up our livelihoods. It may also be one of the first places where we willingly cede over the rights to privacy of our innermost thoughts and feelings—where we will allow the state to look inside our brains, bodies, and minds. The airport is where, as Keele University geographer Peter Adey points out:

the body's circulatory systems, biological rhythms, and affective expressions have become the object of suspicion— mobile surfaces from which inner thoughts and potentially hostile intentions are scrutinized, read, and given threatening meaning by the newest modes of airport security and surveillance (2009, 274).

Predictive and preemptive neuropower is super-charged at the circulatory membrane of the airport. Technologies and tactics described earlier, including the Israeli Suspect Detention System (SDS), DARPA's Remote Personnel Assessment (RSA), the Department of Homeland Security's Future Attribute Screening Test (FAST), and Paul Ekman's Screening Passengers by Observation Technique (SPOT), are all designed to thwart potential terrorist attacks in the high volume, high-stakes surveillance battlefield of the airport (Karp and Meckler 2006, Weinberger 2010). And this mountain of acronyms is just the tip of the iceberg. Neuroscience still in the research lab promises even greater sophistication in uncovering inner thoughts.

At Berlin's Bernstein Center for Computational Neuroscience, researchers are fine-tuning devices and techniques that can determine what intention an individual has in her mind. At the Oceanit Institute, Ian Katijima and others have developed technologies to sense increased heart rate and blood flow remotely, but soon he says, "the technology will be much smarter. We'll scan a person…and tell what they're actually thinking" (quoted in Hawksley 2007). While these sanguine predictions for mind reading technologies are certainly not shared by all those working in the brain imaging and surveillance world, many would probably agree with psychologist Todd Braver when he says that "the barriers that we assumed existed in reading our minds keep getting breached" (quoted in Associated Press 2007).

Researchers around the world are working hard to crack open the secrets of the mind to help "locked-in" patients communicate, to help people move

prosthetic limbs with their mind, and to help people with behavioral and neurological disorders, but given the pressures on those in government to protect citizens at higher and higher costs, access to technologies that can read the mind of potential terrorists and preempt catastrophic violence makes the ability to resist the use of these technologies weak. One demonstration of how these tools could have stopped an actual attack, but were not used, would end the career (or worse) of the person responsible for that decision. Therefore the scrutinization of thoughts, emotions, affects, and other internal "evidence" will be strongly motivated, and may overwhelm our historically coveted right to privacy. In short, we will be asked to "open our minds" at airports in order for politicians and officials to "cover their asses."

The criminal justice system is fundamentally oriented toward issues of prediction and preemption. From patrol to parole, good metrics for correct sentencing, reducing recidivism, reducing public risks, and maintaining fairness are central to the mission. Neuroscience offers very enticing tools for improving these decision-making processes, and for crafting more accurate, individualized, and effective protocols. Much like the pressures on officials to prevent a future terrorist attack, access to neurological tests and imaging results that could show if a felon is more or less likely to commit future crimes will make these tools almost irresistible. Knowing the "objective" measure of impulse control of a sex offender would be cherished information for those responsible for releasing a prisoner. These tools also have the added benefit (for those in decision-making positions) wherein the responsibility for any error can be safely abstracted to the system, rather than the actual individual(s) in charge.

This kind of predictive and probabilistic modeling could also be used to establish surveillance and monitoring protocols for those who show signs of neurological characteristics associated with criminal behavior, but have not

committed any crime. Young psychopaths, for example, have distinct brain abnormalities:

> associated with structural and functional damage to the orbital cortex and strongly interconnected ventral prefrontal system structures such as the ventromedial prefrontal cortex, ventral anterior cingulate, amygdala, and associated basal ganglia and cortico-subcortical loop circuits (Fallon 2005-2006, 341).

If brain abnormalities can be uncovered before a violent act occurs, what is the role of the police and medical establishment to do something about it? This is one of the central tensions in neuropolitics, and one that has the familiar false positive/false negative risk profile.

Rapid advances in neuroscience and neurotechnology are taking hypothetical ethical questions and making them a matter of policy today. We'll see a range of responses, as case-by-case aggregation will start to converge into trends. One signal does not make a trend, but the implementation of "predictive policing" by the Santa Cruz Police points to a possible future. Using a statistical model developed at Santa Clara University that predicts the times and locations of criminal activity, Santa Cruz police are scheduling patrols that *prespond* to these predicted crimes before they happen. "The overall model is based on the belief that crime is not random. So with *enough data points*, you could predict where and when it will happen," says Zach Friend, a Santa Cruz Police Dept. analyst (Baxter 2011). And while it is certainly an overstatement to say that these kinds of models will apply to an individual's brain scan, the logic of predictive policing is beginning to enter into mainstream police strategy. It is not a stretch to think that some aspects of neurological profiling might be added to a police forces' repertoire of future "data points," and not too early to consider the neuropolitical implications of this.

Another key location for the mobilization of the neuropower of preemption is within the "war on drugs." This "war" has been the justification of a litany of expansions of governmental powers, intrusions, violations, and suspensions of common sense. At its most fundamental level, national drug policy is about what we as individuals are allowed to do to and with our minds and bodies. It is a fight over the right and the freedom to alter the way we think and feel.

Governments around the world seem to be waking up to the fact that a supply-side eradication strategy is doomed to failure. In its place, as legal scholar Richard Boire argues, "the federal government has begun pursuing a new tactic, one that expands the drug war battlefield from the Columbian coca farms and the Middle Eastern poppy fields, to a new terrain directly *inside* the bodies and brains of drug users," leading to a policy shift from "demand reduction to desire reduction" (CCLE 2004, 6).

A Center for Cognitive Liberty and Ethics report titled "Threats to Cognitive Liberty: Pharmacotherapy and the Future of the Drug War" (2004) outlines several new biological techniques that in one-way or another reduce desire for certain drugs. These bio- and neurological tools are designed to help those who are addicted to drugs but cannot effectively end their addiction.

Pharmacotherapy works via several modalities. One way is to chemically block drug receptor sites at the neuron, preventing drug molecules from binding to the neuron and producing their mind-altering effects. Second, a class of drugs works in the bloodstream to bind to the illegal drug molecule, making it too large to pass through the blood-brain barrier. And finally there are "metabolism modifiers" that change how the body metabolizes the drug, often generating a very unpleasant feeling for the user, as with the alcohol deterrent Antabuse. Opiates, cocaine, alcohol, marijuana, and nicotine are just some of the drugs targeted by pharmacotherapy (CCLE 2004, 6-11). And

now, enterprising lawmakers have discussed the use of the "drug vaccines" not only for those who are already addicted to illegal drugs, but as a way to inhibit a citizen's ability to "get high" off of illegal drugs even before their first use.

The United Kingdom has been the most aggressive in pursuing the possibility of drug vaccines as policy. A government commissioned report, "Brain Science, addiction, and drugs suggested that in the face of regulating failures to curb the use of illicit drugs, "we might imagine an approach that resorts increasingly to a technological fix" (quoted in Easton 2009). This technological fix includes the use of pharmacotherapy and "drug vaccines."

While public sentiment is still squarely against the idea of compulsory vaccination of citizens (including children), and the scientific efficacy of these drugs is still uncertain, pharmacotherapy will continue to be a promising area of research and treatment for those suffering from debilitating addictions. To repeat the running theme here, once the tools exist, those with the power to use them to their own advantage or toward their own ideological goals often do. It is a well-known occupational hazard for scientific labor to be used in ways incongruous with the goals and value-systems of those laborers. Neuroethicist Ronald Green points out the ever-lurking irony that "research begun to provide a means for improving human health may eventually come to be known best for its contribution to social control" (Green 2007, 119).

Conclusion: Responsibility in the Neurocentric Age

This chapter began with stories of fear and folly for individuals and

governments trying to cope with profound threats in an accelerating VUCA world. The speed of life and the compression of distance have distorted our capacities to recognize and deal with risk, leading to a pandemic of amygdala hijackings. These dynamics are at the heart of the emergence of three important neuropowers—treating similarities as equalities, mental surveillance, and prediction and preemption.

Treating similarities as equalities is a necessary part of human perception and cognition, but we often forget that it is a short-cut for more robust and fully engaged kinds of thinking. The exigencies of the speed and connectedness of our world will push us, and most importantly our institutions, to use these short-cuts in ways that begin to negatively impact our capacities for fairness, justice, and prudence.

Mental surveillance will open up aspects of how we think and what we think in ways never before possible. It will change the way we talk about rights and expectations of privacy, and will create a new locus of political contestation. This includes not only peering directly into the mind, but also new kinds of digital surveillance of our electronically extended and digitally distributed minds.

Prediction and preemption are highly seductive and extremely powerful tools that are being enabled by neuroscientific research and applications. Perhaps no neuropower discussed in this dissertation has as much potential for abuse and as much need for wider examination by the general public. Every application and instantiation of these techniques should be thoroughly interrogated, and the values behind these applications should be laid bare and critiqued.

These neuropowers are enabled by a technical and knowledge-power infrastructure being built by researchers in the brain sciences and members

of the public who are actively creating databases of extended cognitive information. A governmentality of control is being driven by the perception of greater existential risks, creating incentives for expansion of intrusions and invasions of privacy.

All of these arguments lead to the overall conclusion of this chapter: when a security state becomes neurocentric, we must be particularly vigilant about how neuroscience drives policy. It is incumbent upon neuroscientists, ethicists, and all those with a political stake in neuroscience—or even those who simply care about democracy—to examine and critique the machinations of neuropower. The forces of control should not be bolstered by exaggerated research claims, unverified technologies, premature application of research, and neurological determinism. If these cautions are not heeded, then the potential transformative benefits of neuroscience and neurotechnologies will be lost, as will key tenets of democracy, freedom, and many opportunities for happiness for future generations.

Chapter 4: Who owns the extended mind?

Neuroscience and technologies are introducing new forces into the brain, while at the same time the human mind is extending itself into the world, outsourcing more and more cognitive functions to the artifacts populating our environment. Neuropolitics highlights a host of new involvements for the brain and mind. It re-orients many of our common activities in light of the unseen forces that condition the thinkable.

Why IP?

In the last chapter, we explored how speed, security, and surveillance were generating important political dynamics that impact personal privacy, social control, and the neurocentric governance of risk. Control mechanisms involving "mind reading" are understood at an immediate, almost visceral level. The subject of this chapter however, the neuropolitics of intellectual property law, may not seem as obvious a threat to liberty and justice. However, the "ownership of the extended mind" is every bit as important to personal freedom and the practice of democracy.

In erecting a conceptual bridge between intellectual property (IP) law and the mind it is possible to treat the invasions, artificial barriers, legal absurdities, and technological impediments that exist in the artifacts and institutions of our world as invasions, barriers, absurdities, and impediments to the operation of our minds. The architecture of the Internet, for example, should also be considered a functional architecture of the extended mind. If, as the theory of mind that informs this work suggests, we "create our cognitive powers by creating the environments in which they exercise those

powers" (Hutchins 1996, xvi), then the scope of the neuropolitical involvements of individuals and their governance systems are significantly broadened. This broadening of scope is essential to understanding the actual stakes of cognitive liberty involved as intellectual property law begins to govern more of the extended mind.

This chapter explores the implications of those changing stakes and widening scope of neuropolitics. While I will touch upon some issues of how IP law relates to the work of neuroscientists and the creation of new neurotechnologies,[38] the focus of this chapter is on Intellectual Property as a tool of governance of the extended mind.

Section 1 will lay out the foundational argument to why IP matters to neuropolitics, and introduce the main forces moving in this space. Section 2 examines the changing nature of the author function, and how notions of distributed cognition and creation disrupt the default assumptions of IP law. And finally, Section 3 looks at the shifting boundaries of regulated and unregulated expression. These shifts point to how the ownership of content is being enclosed, and freedoms of expression foreclosed. This chapter makes the case that end user license agreements and digital rights management are as politically relevant to neuropolitics as mental surveillance or cognitive enhancement.

Governing the new

Whether through language, writing, the built environment or other symbiotic technologies, humans have always found creative ways to distribute, offload, and store functions of our minds (Clark 2004). From cuneiform tablets to record harvest yields to sticky notes on a refrigerator door, people use the

world to remember and to think with. Today, an increasingly large population of computer and mobile device users extend their biological selves with machines linked via digital networks. As people integrate sensory and cognitive functions with new technological platforms—new *wares— they blur the boundaries between agency, control and ownership. Indeed as this chapter will show, the insinuation of intellectual property into our sensory and cognitive prosthetics is one of the most important political questions humans face.

As mental processes move not only to our surrounding devices, and these devices move to the "cloud" of networked computing and communication technologies, the mind is moving into a atmosphere of rules and controls that most would never accept back in the non-networked world. For example, many terms of service (ToS) for social networking sites require the user, as a precondition of use, to license the owners of the site to search and even share the user's information with 3rd parties.[39] Also, most of the digital music we "buy" comes with rules that we cannot share it with friends, and limits the number of devices that are allowed to play the music. Imagine the application of these rules in other domains. For example, as a condition of being listed in the white pages, what if you allow the publisher full access to the content and participants of your phone calls? Or, imagine a compact disk that will not play in your rental car because the car's player has not been licensed or authorized to play it. The political and power formations generated through intellectual property discourses and policies will profoundly influence the range of experiences available to people in all aspects of their everyday lives.

Intellectual property, through all its permutations in law and policy, is at its core a technique for governing the new. In almost every domain of IP, from invention to original expression, and even from derivation to the copy, the policy rationale is to encourage the creation, sharing, and then the protection of the new. And yet, as a form of governance practiced today, many legal

scholars argue that IP is most frequently deployed as a tool for the old to *control* the new, rather than nurture it. Incumbent powers have used IP law to stifle competition, impose artificial scarcity, and to extend monopolies and anti-competitive practices in the marketplace (Lessig 2004, Vaidhyanathan 2004, Drahos 2002, McLeod 2007).

However, these practices aren't just bad for business or for free speech. As minds are further distributed into networks of control, this misuse of IP signals a major threat to cognitive freedom—one that has the potential to regulate access to the very resources in the environment that are necessary for thinking. The mind might be less and less inside the head, but, as I argue, it is moving more and more into a world of control—a world with pastures of intellectual fences, thickets of proprietary technologies, libraries of owned expressions, highways of mental toll booths, and labyrinths of necessary permissions.

The mind doesn't end at the borders of our head. With distributed cognitive systems and distributed agency, consisting of networked layers of bodies, brains, technologies, and discursive scaffolds, how does the concept and practice of intellectual property mediate relations among these structures? If, as cognitive parallelism posits, we think *with* our environment, what are the neuropolitics of thinking with a *copyrighted* environment?

Clearing rights to think

In *Bound by Law,* a graphic book dramatizing the chilling effects of copyright law produced by Duke University's Center for the Study of the Public Domain, the act of producing a documentary film is compared to walking blindfolded through a minefield—with every step expecting a copyright claim to blow up in your face (Aoki, Boyle, and Jenkins 2006, 9). And even when common

sense might tell you you've reached the safety of the commons, sometimes a landmine still finds it's way under your feet.

Take John Else's story, for example. Else, a documentary filmmaker, made a film about the life of stagehands on Broadway. During filming, he caught two stagehands having a sandwich and watching TV in the rafters above a live play. Reminiscent of a famous scene from Citizen Kane, the stage hands' nonchalance about the play happening right below them comedically juxtaposed "high" and "low" culture—
a point driven home by the fact that the stage hands were watching the animated comedy show, "The Simpsons." When Matt Groening and Fox Television became aware that this 4.5-second clip of his show playing on a small TV was going to be included in the documentary, they did not prohibit Else from using the clip. Rather, they merely requested Else to pay a licensing fee of $10,000. Although Else might have ultimately won a fair use argument, he anticipated that the cost of fighting the case against a team of Fox lawyers would be too great, and decided to cut the scene (Aoki, Boyle, and Jenkins 2006, 15-16). Considering the punishment for copyright infringement, which carries a penalty of up to $150,000 for every act,[40] who can blame independent content creators for their inhibitions and taking default positions of self-censorship (Lessig 2004, 95-99).

A filmmaker, writer, or producer who intends to use content (be it an image, clip, phrase, or other expression) that belongs to someone else must first "clear rights" before that content can be shown legally. Clearing rights involves tracking down the owner or owners of the copyright of the desired content, and asking or paying for permission to use it. This process of clearing rights is often time consuming, frustrating, and expensive (Aoki, Boyle, and Jenkins 2006, 5-12).

Imagine walking down a typical city street and recording your experience. Then, watch the recording and take account of every advertisement, every originally designed object—from buildings to cars to a pair of earrings, and every piece of ambient music you hear. Now consider the task of tracking down ALL the owners of those copyrighted materials and asking each of them for permission to use their content before showing your recording to anyone else. This is a challenge faced by documentary filmmakers, artists, and others whose works are filled with the intellectual property and copyrighted artifacts that inhabit our everyday lives. It is a dilemma that is also very real, but often ignored at some level of legal risk, by the millions posting their home videos to YouTube and similar sites (Tehranian 2007).

In U.S. law, at least, there is a strong tradition of "fair use" rights. Fair use of copyrighted materials includes social commentary, parody, political speech, criticism, or when the material in question is incidental (or of such a short duration) that it does not rise to the level of infringement—a short quotation in an academic article, for example. But what constitutes fair use is anything but clear in the law, and decades of litigation by content owners has squeezed the borders of fair use down to increasingly smaller and more limited uses (Lessig 2004, 141-143).

Content companies, media carriers, artist rights' groups, and other organizations and individuals have been sent into a state of paranoia over the flood of "pirates" and "thieves," who they perceive to be eroding their profit margins by illegally distributing copyrighted materials. These organizations have spent millions lobbying to increase their ability to monitor and control how content is made, used, and shared (Mesnick 2011). Examples abound of seemingly absurd legal actions by the controllers of content: Teenagers who share music files have been sent "cease and desist" letters and arrested for infringement.[41] ASCAP, the composer's rights organization, sued the Girl Scouts of America for not paying royalties to the owners of the songs they

sing around the campfire, including "Happy Birthday," songs overheard on car radios, cell phone ring tones, even catch-phrases uttered in conversation by documentary subjects have routinely come with either a massive price tag to include legally the film, or an ever-higher cost threat of lawsuit if included without clearance (Lessig 2004, 18). Teams of assistants scour the mise-en-scene of location film sets to make sure no unlicensed intellectual property is visible, while other teams place products strategically in the scene for paying advertisers. *The mental commons is a battlefield of neuropolitics, and IP law is a powerful weapon.*

But this is not just a problem for documentary filmmakers or professional artists. Ubiquitous mobile cameras and live streaming to the Internet has made billions of media-makers potential, and very likely, copyright infringers (Tehranian 2007). From forwarding emails to uploading home videos, almost every act we perform on the Internet creates a copy that contains someone else's content. YouTube's servers trawl the millions of hours of video on its site and automatically take down any video that its copyright surveillance tools indicate contains unlicensed copyrighted material.[42] Networked technologies have enabled regular human social practices to turn us into, in legal scholar John Tehranian's phrase, "a nation of infringers" (2007).

At this scale, the political importance of direct and indirect IP controls becomes evident. The choice between self-censorship, a time-consuming and expensive licensing process, or simply risk ignoring copyright law, is really no choice at all for a free and open society. If the very act of capturing and sharing events from our lives puts us in the cross-hairs of such legal threats, then we must question whether the intent or effect of the law makes any sense from the perspective of the public good.

Critical legal scholar Rosemary Coombe argues that the limits IP laws, including patents and trademarks, have put on our individual and collective

ability to create and share expressions has strengthened the mechanisms for reproducing hierarchies of privilege and power. More of the public domain is moving off limits to copy or imitation, being privatized by those whose "good will" has turned content into property. By "controlling mimesis," Coombe argues, "they police alterity" (1998, 181).

The freedom to use the language of the establishment to critique (or outwardly mock) that very establishment is essential to a healthy democracy. As Rosa Luxembourg has said, "freedom is the freedom to think differently" (in Rancière 2004, 74). The freedom to use language, images, knowledge, memories, and all other forms of our cultural and scientific heritage in new and challenging ways should not be overly inhibited by the dictates of property. "Who owns the extended mind?" is a question of priorities and values, a question that has driven a range of colorful responses.

Whose movie is this?

Novelist and counter-culture icon Ken Kesey used to ask his band of merry pranksters, and others, the question, "whose movie is this?"[43] Foreshadowing today's world of ubiquitous cameras, Kesey and friends recorded much of their life on film. So, the question could be taken quite literally. However, Kesey had a much more subversive and philosophical meaning to the question. He was really asking: whose version of reality do you subscribe to? Often this was framed as a choice between the default reality of Western culture and the reality that was being improvised on the spot by those who rejected this consensus—those who had passed the "test."[44] The question served as a persistent reminder to challenge the "given" social narratives of gender, family, religion, and politics that defined the 1960's discipline society in the U.S. It exchanged the closed world discourses of the military-industrial complex for an open world of psychological and social experimentation.

Merry prankster veteran and so-called "network entrepreneur" Stewart Brand brought this counter-cultural sensibility with him to the launch of his printed, analog search engine, the Whole Earth Catalog (Turner 2006). The famous opening line "We are as gods, we might as well get used to it," carries that strange mix of hubris, pragmatism, and global responsibility that defined this cohort of personal and social experimenters. A liberated and empowered individual expected the freedom to "conduct his [sic] own education, find his own inspiration, shape his own environment, and share his adventure with whoever is interested" (Brand 1969).

From this perspective, Brand's philosophy looks like a design brief for the Internet. This is no coincidence—living your own movie and sharing it with peers outside the distant, obsolete sphere of institutional power fueled the imagination of many of the original engineers and programmers who designed the hardware and software protocols that became the Internet. Equality of data packets, peer-to-peer architecture, TCP/IP protocols, open source codes, and many of the intentionally "out of control" aspects of the Internet can trace their lineage to the mentality of 1960's counter-culture (Turner 2006).

This "terrifyingly ungovernable" system, as Harvard Law Professor Siva Vaidhyanathan calls the architecture of the Internet (2004, 32), was a perceived threat to incumbent media and industry powers that wished to harness this transformative technology. As AOL and Netscape were just beginning to open the doors of the Internet to mainstream users, former Grateful Dead lyricist and Electronic Frontier Foundation founder John Parry Barlow fired off a manifesto expressing his vision for the future of the Internet, *A Declaration of the Independence of Cyberspace* (1996). Barlow's hyperlinked metaphors and messianic rhetoric reflected a mix of Enlightenment philosophy, libertarian ideals, and cybernetic disembodiment tropes, all marshaled to save the Internet from the "hostile and colonial

measures" of "distant, uninformed powers" who wished to tame the wild beast of the Internet using their outmoded policy frameworks and business models (1996).

Early on, Barlow recognized the threat that "obsolete information industries" would pose to his vision through their desire to impose laws "that claim to own speech throughout the world" (1996). If the feminist slogan was "keep your laws off my body," Barlow and company's equivalent might be "keep your laws off my mind," as they were willing to give up their cumbersome flesh in order to have the complete freedom to build electronic castles of the mind.

Many activists and scholars who favor notions of "free culture" via the Internet and beyond would probably say that the forces of control have won more battles than they've lost (Lessig 2004). Artificial scarcity and control mechanisms on the Internet have taken hold. Although a sustained backlash against "excessive" IP rights exists,[45] the default position of most in positions of power seems to be, however, in the words of legal scholar Rochelle Dreyfuss, "if value, then right" (quoted in Lessig 2004, 18). In other words, if something has value, even if it is inexhaustible and it's use by others does not take away from the owner, then someone or some group should have exclusive legal rights to it. University of Arizona law professor Carole Rose echoes this opinion when she notes the general ideology of the U.S. to be that "the whole world is best managed when divided among private owners" (in Lessig 2004, 13).

Intellectual property law, especially copyright, has been on a consistent trajectory of expansion. Intellectual property protection has ballooned into new media and new domains of life (including life itself). This expansion has been accelerating over the last 40 years.
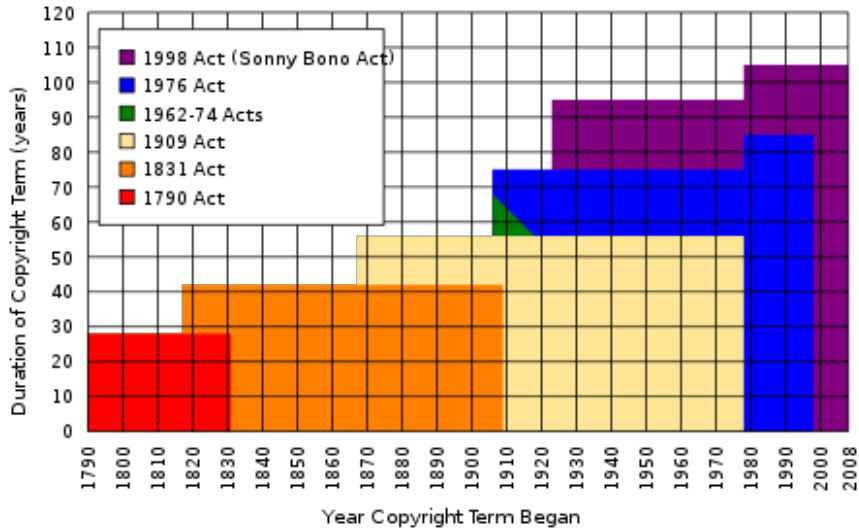
FIGURE 10: HISTORY OF U.S. COPYRIGHT EXTENSIONS [46]

Copyright has expanded in scope and has been extended in duration. Where once copyright law was a marginal legal domain that mostly concerned publishers and professional artists, writers, and musicians, it now affects every one of us in some way on a daily basis.

Over the course of the history of copyright in the U.S, copyright has been expanded no less than 11 times. These extensions have extended this "limited" monopoly from a 14-year renewable term to the current term of "life of the author plus 70 years."[47] Scope of copyrightable subject matter has expanded as well, from "books, maps, and charts," as defined in the Constitution, to any "original work of authorship fixed in a tangible medium of expression."[48] And since these rights are now automatically applied to all original works, there is no need to display or apply for copyright protection.[49]

These expansions and extensions have pushed copyright law into the forefront of the governance of our information and communication channels. "The Internet," as Stanford Law Professor Lawrence Lessig points out,

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"should at least force us to rethink the conditions upon which the law of copyright automatically applies, because it is clear that current reach of copyright was never contemplated, much less chosen, by the legislators who enacted copyright law" (2004, 140).

Copyright has been called an "intellectual land grab" by Duke IP scholar James Boyle (1997). While not designed as such, it has become a tool to limit free speech, to commodify the noncommercial, to propertize the commons, to privatize the public, and to regulate what was once unregulated. The governmentality of intellectual property law will define a key domain of neuropolitics, and has profound implications for the future of culture.

If large, consolidated media companies and the forces these media represent can no longer easily convince us to play a part in "their movies," then the next best strategy seems to be to limit the creative resources available to individuals and independent creators by locking these resources behind technological walls or draconian IP protections, or both. If the radical question that influenced the counter-culture as it spawned the cyberculture was "whose movie is this?," the critical question of the web 2.0 social media world is "who, or what, is in your movie (and do they have a right to be there)?"

Permission culture

Intellectual property law has created a situation where the new has to ask permission from the old in order to proceed forward. As was introduced in Chapter 1, "permission culture" is the term Lawrence Lessig uses to describe the kind of society being crafted by the forces of control. He laments that:

> the rough divide between the free and controlled has now been
> erased. The Internet has set the stage for this erasure and,

pushed by big media, the law has now affected it. For the first time in our tradition, the ordinary ways in which individuals create and share culture fall within the reach of the regulation of the law, which has expanded to draw within its control a vast amount of culture and creativity that it had never reached before...The consequence is that we are less and less a free culture, more and more a permission culture (2004, 13).

But the war for the soul of the Internet is not over. Ironically, the Internet was conceived within the military-industrial mindset of a closed, command and control discourse but was designed by coders who valued openness, anarchy, and freedom (Turner 2006). The architecture of freedom that supports the Internet still remains intact, and while "net neutrality" fights still rage in policy circles, new innovations in social media and web 2.0 have turned everyday people into published authors, video celebrities, and primary influencers of style, opinion, and culture.

The disruptive economic and political potential of the Internet is still palpable.[50] In record number, and with uncommon zeal, users around the world are "actively composing the soap-opera of their own lives [rather] than zoning out in front of someone else's (Johnson 2006, 120). They are using the Internet and all the programmable networks in our environment to create the cognisphere, described by Katherine Hayles as "an interconnected cognitive system in which humans are increasingly embedded" (2006, 161).

Although blurred by notions of distributed agency and cognition, new social technologies and networked access to the global cognisphere have empowered individuals to bring their creativity to mass audiences via electronic distribution networks and bypass censoring by market "middle-men" who were at one time necessary for developing and distributing content.

The consequent unleashing of individual minds is threatening to the business models of centralized major corporate content providers. Limiting access to and controlling the content "under their roof" allows them some semblance of control over culture and expression, and to squeeze any remaining profit out of what many believe is an obsolete and anachronistic business model. Those who do not adapt and who continue to create false scarcity, cripple the use of their own products with technological or software restraints, and punish their customers for normal behavior may eventually have their power taken from them, although not willingly.

The new and novel has to wade through a minefield of legal risks and controls that have been put in place by incumbent powers. In many ways, the foundations of IP law have been stretched beyond their mission and even their logic to accommodate this desire for control. In the next section, we will explore another way IP law has been disrupted, this time from the perspective of authorship, and the challenge that neuroscience and collaborative creation have presented for IP.

Redistributing Authorship and Authority

Throughout this dissertation I have given arguments and examples of how neuroscience, cognitive technologies, and brain-based philosophies have been catalysts for a redistribution of the sensible. These neurocentric approaches require a reconsideration of the dominant working assumptions about identity, subjectivity, privacy, security, and even epistemology. Because they deal with the author and editor of knowledge, the brain sciences impact everything humans are and more importantly, everything humans think they are.[51]

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As intellectual property law has become a major element in contemporary political and economic debates, it has come under intensifying scrutiny from a wide-range of critics in law, philosophy, and social science. There are profound implications for IP law stemming from insights into the way the mind works, and especially into the way it creates (explained below), but the application of cognitive and social neuroscience to the foundations and practice of IP law has been rare (Goodenough and Decker 2006, Greely 2004, 148-155).

The understanding of human cognition and agency as a distributed process of brains, bodies, and techno-culture presents a stark challenge to the romantic-authorship model that stands as the foundation of our western systems of intellectual property rights and policies (Rose 1993). In this section, some of the more destabilizing aspects of neuroscience for IP are explored, citing several examples of attempts to deal with new ambiguities arising from the novel ways people are creating and sharing content in the 21st century.

Authoring the mind

"The two of us wrote Anti-Oedipus together. Since each of us was several, there was already quite a crowd" –Deleuze and Guattari (2004).

The idea of a bounded, isolated individual who creates an original work through solitary labor and genius has been the backbone of the romantic authorship model of copyright and patent (Rose 1993). No doubt this fiction of the romantic author misrepresents the creative process as it is actually practiced, as authors create not from the void, but from the chaos of life (Lethem 2007). Moreover, irrespective of the question of whether the mind's productions deserve property protection, it evinces a deep misunderstanding of how the mind works. Cognition and creation are highly promiscuous

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processes that involve the coordination of functions across brains, bodies, technologies, spaces, and most importantly, other people (Clark 2004, Hutchins 1996). Distributed cognition and the extended mind have been explained and applied in previous chapters, but in light of its relevance to notions of bounded, individual authorship, a brief review of this theory of mind is in order.

A wide collection of cognitive neuroscientists, anthropologists, philosophers, and social psychologists have advanced the theory that thinking is a process that does not start and end only with computation inside a brain. To proponents of this model, cognition is best explained by looking at it as a system of coordinated functions within a larger system—an ecology of mind (Clark 1997, Hutchins 1996, Bateson 1972).

Given this, the basic concept of an individual mind within a person is difficult to justify. The systems and subsystems of cortical functions have been built over millions of years of human evolution. "Thinking" as Nietzsche put it, "is an arbitrary fiction, arrived at by selecting one element from the process and eliminating all the rest" (quoted in Connolly 2002, 67). Most tend to focus on the soloist and not the symphony, the psychology rather than the sociology of the mind (Johnson 2004, 6).

The conscious narrator we call a mind, or a self, represents but a fraction of the total processing that occurs in the brain and within an extended system of thought. In fact, the very feeling of free will – a core tenet of the modern concept of self – may be an illusion of this narrator (Norretranders 1999, Gazzaniga and LeDoux 1978). Research has shown that humans become aware of decisions only after they have already been made— as the mental narrator then retroactively attributes intention to the decision (Gazzaniga 2005, 89). In essence, new insights from the cognitive sciences have disabused us of the naïve acceptance of the individual as an unproblematic

unit of analysis. Within the brain, and outward through the extended mind, the boundaries we have naturalized and institutionalized have begun to blur. "As the world becomes smarter and smarter and gets to know us better," writes cognitive philosopher Andy Clark, "it becomes harder to say where the world stops and the person begins" (2004, 7).

Contemporary society does not seem comfortable with the idea of blurring the boundaries of the human body or mind. As literary critic Katherine Hayles notes, most of our habits and models of thought wish to avoid "the realization that the synaptic noise within mirrors the world's noise without" (1999, 276). And, some may ask, why should we challenge the isolationist, individualist model anyway? In fact, this is an argument that has been posited against radical notions of distributed cognition. Why, the argument goes, give up institutions built on isolated cognition, when society "gets all the goodies" (i.e. the riches and rewards of modern civilization) from this model anyway?[52]

The answer is that even if one accepts the (questionable) argument that individualist notions of authorship and citizenship have historically enabled social advancement, the model of bounded individualism is simply unequipped to deal with the way that value is created in the 21st century. Individualist allocation of rights and property was a strategic solution to the challenge of how to allocate and incentivize intangible intellectual property, but as society advances it is looking more and more anachronistic, and becoming harder to justify as fair and socially beneficial.[53] Recognizing the fragmentary and collaborative aspects of thought foregrounds the neuropolitical importance of our structures, formal processes, technological artifacts, built environments, public language, culture, and bodies as not only partners, but also constitutive agents, in the totality of mind. The world is our extended mind, but it is not yet treated as such.

Who counts as an author?

Intellectual property works by creating artificial boundaries around content—enclosing information in order for it to be controlled and to generate a return on "investment." Copyright functions by creating a border between tangible expressions, with authorship itself acting as a boundary function. In *Authors and Owners*, University of California at Santa Barbara English professor Mark Rose argues that copyright "not only makes possible the profitable manufacture and distribution of books, films, and other commodities but also, by endowing it with legal reality, helps to produce and affirm the very identity of the author as author" (1993, 1). Intellectual property law constructs a certain kind of subject (author) for which it can regulate and control. Becoming an author is the "gate through which one must pass in order to acquire intellectual property rights" (Boyle 1996, 125).

But not all entities have equal rights to pass through this gate, for if forms of creative production fall outside the norms of legitimate authorship, then these forms are ignored, censored, stolen, or punished. The epistemological foundations of bounded authorship have never correctly reflected the actual flows of influence and interconnectedness of creativity. Moreover, the default modes of the author function are becoming increasingly anachronistic and counter-productive in the networked world we live in now.

There many forms of what might be called messy, noisy, or ambiguous creation that copyright law has had a hard time governing effectively. Indigenous knowledge and cultural heritage have been very difficult to codify, creating opportunities for legal (and often unjust) appropriation of indigenous innovations and expressions by individuals or corporations who are more equipped to navigate the letter of IP law in the West (Brown 2004, Marden 1999, Siva 1997). Furthermore, the question of cultural authorship for art, poetry, and other creative expressions, and what is "prior art" for

ancient medicines or technical inventions, is difficult for intellectual property regimes as they stand today. Within the current paradigm there simply are no easy answers to these questions, no "comfort of absolutes" as anthropologist Michael Brown concludes in his study of the intersections of intellectual property and indigenous rights (2004, 41).

Control requires a system of management based on a particular form of knowledge, and the creation of facts that support that system. For IP, protections are built upon a regime of knowledge that requires authorial attribution and provenance. Indigenous and collective models of creation do not fit neatly into this system, and have been easily ignored. But as indigenous invention and art come to have value in Western society, IP regimes are both trying to expand conceptually to include these other forms of authorship, as well as trying to shoehorn alternative authorship into the bounded models that it knows how to manage. Ironically, this movement for increased intelligibility (and control) of alternative forms of authorship is being led by the apotheosis of artificial collective existence, the corporation.

Today, even ownership of our own biological make-up and lab-created organisms is not clear-cut (Halbert 2005). The U.S. Supreme Court case of *Diamond V. Chakrabarty* (1980) established, for the first time, that there are conditions in which patenting of life forms is legal. Over the years, more and more biological matter, and even living beings, have been enclosed in a property regime. Some estimate that over 20% of the human genome is now functionally enclosed in patents (Jensen and Murray 2005).

A troublesome trend has been that if adequate "labor"—a barrier that is often set very low (Coombe 1998, 94-100)—is added to a biological process or element in the biological public domain, then often that labor is often rewarded with IP rights. Just 10 years after the *Diamond v. Chakrabarty* case, the Supreme Court ruled on ownership of human body parts. In the famous

case of *John Moore v. the Regents of the University of California* (1991), the Court ruled that Moore's own cancer-fighting t-cells could in fact be patented and owned by someone other that Moore, and against his will. In this case a group of UC Berkeley scientists claimed and were awarded ownership because of the labor they added to this natural resource to "reduce it to practice," and turn it into a useful medical product (Wald 2005).

In addition to indigenous art and biological patents, massively distributed and collaborative authorship also creates intellectual property headaches. Without pre-determined arrangements for ownership, collaborative media can be a confusing terrain for determining rights. Potential solutions vary in effectiveness. Wikipedia, for example, technically gives each of the millions of contributors the right to their specific contribution.[54] Evernote, a popular software application that allows people to post notes, images, and other bits and pieces of their lives allows the user to retain copyright over the materials they post to their account, but requires the user to issue a license to Evernote "so that our processing, maintenance, storage, technical reproduction, back-up and distribution, and related handling of your Content doesn't infringe applicable copyright and other laws."[55] Almost every digital act creates a copy, and software applications like Evernote must have explicit consent to process user-owned content.

Or, even more provocatively, consider the movement toward collaborative citizen science and the case of *Foldit*. *Foldit* is a game designed by biochemist David Baker and his colleagues to harness not just the "idling capacity" of networked home computers, such as the popular *SETI@Home* had done since the late 90's, but to utilize the much more effective and efficient spatial manipulating brains of users themselves. As Baker notes there is "this incredible amount of human computing power out there that we're starting to capitalize on" (in Hand 2010, 685).

The game did not just lead to engaged users who were very effective in finding new strategies for uncovering optimal protein folding patterns, but it also lead directly to scientifically publishable results. And the contribution of those 40,000 home users did not go unrecognized, as the *Nature* article published by Baker also included the *Foldit* players in its list of authors (Cooper, Khatib et al. 2010). If 40,000 home computer users who each contribute a tiny fraction of work toward the final output can be recognized as authors, it is clear that these are highly disruptive and innovative times for the entire concept of authorship. These innovations may or may not collapse the foundation of copyright as we know it, but they will certainly create conditions for rapid evolution of this legal and social technology.

A growing number of platforms are being developed to harness the micro-contributions of users, to tap into what writer Clay Shirky calls the latent "cognitive surplus" of the global population (2010). In this world of distributed micro-contribution, intellectual property law begins to look antiquated at best. While copyright agreements may be fine for Wikipedia, and pride of participation may suffice for *Foldit* players and citizen scientists, what will happen when a billion-dollar pharmacological breakthrough is accomplished with the aid of crowdsourcing? How will "the crowd" be rewarded or compensated for their valuable contributions?

The broad question of how to fairly reward ownership of content in a very fractionalized and collaborative creative universe remains key to the future of intellectual property. Things get even more complicated when we also try to recognize the contribution of our technologies, processes, or even built environments. Consider this dilemma raised by musician and renowned producer Brian Eno:

I think of producing as the act of creating a sonic and conceptual overview of the record. *And this type of creation is a whole new category for which there is no current copyright arrangement.* When you're using sophisticated tools with very strong personalities, *is the designer of the tools in some sense responsible for what finally comes out? Should that designer benefit?* When a new tool or technology comes into existence, and suddenly 50 people at the same time see the same obvious idea, is it right that the one who gets to the publisher or patent office first should get all the material benefits of that idea? If not, how else do we share it? (quoted in Kelly 1995) [emphasis mine].

This issue is highly complex, even within the relatively industrialized world of professional music. Anyone who has seen a producer in action, or seen the results that a good producer with the right equipment can do to improve the final musical product, knows that this contribution is not incidental. Eno calls this collective intelligence and creativity "scenius," as opposed to the singular notion of "genius" (Eno 2009). How do we recognize or reward this collective contribution fairly, of both the human in the studio and the designer of the tools, as Eno points out?

On the notion of rewarding the designer of tools, consider the implications of this issue when applied to other ways we create. For example, the University of California at San Diego has a patent for:

A means and method for inducing a temporary physiological state-of-mind to effect persistent changes to the cognitive-emotive profile of an individual, which is adaptable for neurofeedback and "mental-state" therapeutic and non-therapeutic interventions (Pineda and Allison 2008).

In other words, they have a patent for using magnetic stimulation to improve higher cognitive functions including attention, skill-acquisition, and memory.

Other researchers have demonstrated that direct electrical current applied to the anterior temporal lobe of the brain can help people solve problems faster, and have "flashes of insight" (Chi and Snyder 2011). What then, is the proper reward for the designer of these technologies, when new insights or mental creations are generated in the user? If a direct link between an outside intervention and an original and expressible thought or invention can be made, is it absurd to ask the question of whether the designer or owner of that tool can make a claim to the result? If we can demonstrate, possibly by neural recording a brain before and after the creative moment, that these insights or inventions would not have been made without the technology, what then? Are these questions any more absurd than the intellectual property rights to a man's own lymphocytes being held against his will by a University? And is it possible that the only reason we are disturbed by this is because it is acting directly on the brain itself, instead of acting on the scaffolding of our extended minds?

Serfs don't surf

"The disciplinary man was a discontinuous producer of energy, but the man of control is undulatory, in orbit, in a continuous network. Everywhere surfing has already replaced the older sports" Gilles Deleuze (1992, 5).

"Study the waves carefully, wax your board well, make your decision, and then paddle out to surf those tsunamis of change. Climb up on your board and enjoy the ride of your life. Though you wipe out at the end" Jim Dator (2000).

"People tend to think that it's total control or no control. But the interesting place is in the middle of that. I call it "surfing." When you surf, there is a powerful complicated system, but you're riding on it, you're going somewhere on it, and you can make some choices about it" Brian Eno (quoted in Kelly 1995).

Intellectual property law is a test of balance. In the U.S. Constitution, this balance is expressed by the stated policy goal of Article 6, Section 1, "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Often times today, the method of promoting progress in science and the useful arts seems to overshadow this policy end. This section began with several quotations about surfing as a metaphor because the act of surfing embodies the uneasiness of partial control felt today, and the need for rehearsed improvisations to navigate almost every domain of life.

Surfing is, of course, the predominant metaphor for what we do on the Internet; making endless free-flowing connections from one digital node to the next. Surfing also represents that fragile, limited, and temporary agency that individuals and institutions have over the moves they are forced to make. And finally, it calls attention to the case-by-case, wave-by-wave, trial-and-error process of making policy when any start or finish is merely an arbitrary distinction—a time when politics is never done.

I also bring in the figure of the feudal serf as a counter-metaphor to the notion of surfing, representing the anachronistic governmentality surrounding intellectual property law and enforcement today. IP law is often dictated by the agendas of multi-national corporations who seek vertical control of all the vital tools of creative production in order to maintain their oligarchic grip on content. Australian National University business professor Peter Drahos calls this move toward vertical control "information feudalism" (2002). Drahos and his colleague John Braithwaite document the persistent global attempts to lock down content and intellectual property rights through the mechanism of international treaties such as the World Trade Organization's (WTO) agreement on Trade-Related Aspects of Intellectual

Property Rights (TRIPS). TRIPS' heavy-handed IP protections and threats of severe sanctions for nations who violate the strict mandates of the agreement have "stacked the deck" in favor of powerful nations and corporations who already have an intellectual property advantage.

This global information serfdom allows incumbent powers to transport hierarchies and dynamics of control from their industrial base and bring it into the knowledge and creative economies. Many argue that this control has had the effect of stifling innovation in both developing and developed countries, and has slowed the ability for emerging markets to compete on a level playing field for a share of the pie (Drahos 2002, Halbert 2005, Siva 1997).

And this feudal mentality does not just exist in the boardrooms of multi-national corporations, or in the halls of the WTO. The desire for paternalistic control can also be seen in the intellectual property policies of non-profits, small companies, and even Universities. Take for instance the intellectual property policy of the University of Hawaiʻi at Mānoa's Academy for Creative Media (ACM). All students who wish to take certain ACM courses are required to sign a copyright agreement that categorizes all the work they do in the classes, from scripts to films to video games, as "works for hire." Under the terms of this "work for hire" arrangement the University owns all property rights in those materials.[56] It is an unusual "work for hire" arrangement that requires a person to *pay* an Institution to take ownership of one's work, yet few students seem to resist the policy.[57]

The ACM deems it appropriate to give students a nonexclusive license to their work after two years, but as Lessig points out, the ACM is teaching a clear lesson:

that you, the creator, deserve no creative- or copyright for your creativity. That right should be owned by the man. And while (at least so long as you're good) the man might grant you a nonexclusive license to your creativity, don't even think about the idea that what you create is yours to control. Copyright at ACM at least is not a right grant to "authors," it is a right taken from the authors by the University (2007).

In an interview with then ACM Chairman Tom Brislin about this issue, he offers several reasons why the ACM claimed ownership over student work.[58] First, these kind of policies are becoming standard operating procedure for film schools around the country. In fact, the ACM copyright policy was reportedly brought over directly from the University of Southern California Film School by ACM faculty member Ann Misawa.[59]

Second, as discussed earlier, much of what authorship entails, especially for students in film school, is collaborative in nature. Should the director of a film own the copyright? Or the writer? Or the actors? While negotiating these property arrangements might serve as a great learning opportunity for ACM students, Brislin argues that this ambiguity could easily be resolved simply by transferring ownership of all material directly to the ACM for safe keeping.

And finally, Brislin points out that much of the expensive camera equipment, editing suites, and even the licenses and agreements to shoot in and around Honolulu are provided by the ACM. Therefore, the students themselves would have a very hard time producing any creative work if it was not for the technical and legal infrastructure that the ACM was providing for the students. This blanket policy was a way to keep this potentially messy world of IP neat and tidy for the ACM and its students, even though it may seem unjust and intellectually indefensible to some.[60]

The lesson from this final point is clear: because the ACM is providing the scarce, expensive, and cherished tools of creativity—because it owns the scaffolding upon which student's work is to built—then by its logic it is entitled to the content created using that scaffolding. In addition to the metaphor of serfdom, we might also compare this practice to sharecropping, where access to land and resources was provided at the pleasure of the landowner, and the profits produced by the land returned to the owner, not the laborers (Lessig 2007). In the networked economy of intellectual and creative labor, is our society losing a potentially vibrant ecology of distributed and collaborative cognition to this sharecropping mindset?

Returning to the questions that ended the previous section, why are people disturbed (if they are in fact disturbed) by a scenario in which an invention that "comes" to someone as a result of direct neural stimulation would be owned by the creator of that stimulation device, and yet most people explicitly or tacitly accept that expressions and inventions that come to someone with the aid of *external* devices (be they institutional, economic, or technological) can be controlled by the owners of those external devices. These dynamics can turn the "ecology of mind" into a "plantation of the mind." Will people accept cognitive sharecropping as a politically viable arrangement?

Again, this leaves us with a tricky question of balance. No one creates any novel product or original expression in a vacuum. No one works outside of the direct and indirect influence of a myriad of external cognitive aids, including other people. Yet, when one sees the governmentality of control and the usurpation of many of those oligarchic agents that own the prosthetics that leverage distributed cognition, one can't help but fear the power those agents have to lock down creativity, and stretch their grip of control into previously uncontrolled spaces of the mind.

A Series of Enclosures

The "public domain" is the pool of ideas, facts, histories, laws of science, biological heritage, natural resources, and other elements in our world that in some senses belong collectively to all human beings. But the public domain has often been seen and used by some not as a repository of our collected genius and womb of new creation, but as a vast untapped resource that, when enclosed in a property contract, can be turned into a profitable asset for its owners. What then is the "public domain" of the cognitive ecology?

Intellectual property law is one of the main governing systems of our mental scaffolding. Duke law professor James Boyle calls the series of moves to privatize the cultural commons as the "second enclosure movement," harkening back to the first enclosure movement of late medieval England, when common land was divided and sold to private individuals (2008, 41-53). He proposes a "cultural environmentalism" akin to ecological environmentalism that seeks prudent and sustainable stewardship of our common resources. Boyle points toward the neuropolitical stakes in this second enclosure movement as well, calling it the "enclosure of the mind" (2008). If this enclosure continues apace, Rancière's question of "who can have a share of what is common to the community" begins to lose its relevance, as less and less of life's commons even exist to divide.

This section explores several of the major strategies, and sites of control, that corporations and governments are implementing in this broad cultural and cognitive enclosure movement. These strategies for the commodification of our internal cognitive processes and the privatization of the scaffolds of our extended minds create new sites for neuropolitics. Many of the activities that went unregulated for most of human history are now squarely within the

purview of institutional and micro-political regulatory forces tied to the allocation and enforcement of intellectual property rights.

Enclosing language

In the abstract, censorship of free speech inflames the hearts of those who value democracy. In actual practice, however, censorship is freely allowed and encouraged to take place. Often to appease public anti-censorship values, the dirty work of censorship is offloaded to the private sphere. Metaphorically speaking, the public sphere stays the "good cop," while the private sphere plays "bad cop," as political issues turn into business issues.

A famous example of linguistic censorship is illustrative of this conversion. When a non-profit from San Francisco tried to organize a "Gay Olympics" with the goal of combating stereotypes and prejudice against gays and lesbians, the United States Olympic Committee sued the group for infringement, claiming the USOC (and only the USOC), could decide how the word "Olympic" could be used. The Supreme Court upheld the USOC's claim, citing the Amateur Sports Act passed by Congress in 1978. As James Boyle points out in his analysis of the case, this ruling effectively gave "a state grant of a monopoly rent on a piece of the linguistic landscape," as it would if were granting a trademark for 'Kleenex' or 'Hoover' (1996, 145).

Another lesser-known event in the "Olympics" of censorship occurred in Belgium in 2008. As part of their "Derf Denken" (Dare to Think) campaign, the University of Ghent hired the advertising firm Saatchi and Saatchi to create a series of advertisements with challenging, or counter-intuitive, concepts to help represent daring thinking. One of these ads, a flag for the 2020 Darfur Olympics, caused a controversy. Obviously, from a 2008 perspective, an Olympic Games for this war-torn region is daring thinking, but that was not what caused the controversy. Rather, the International

Olympic Committee, (IOC) owners of the trademarks for the word Olympics, and the image of the Olympic rings, were behind it. The IOC had not authorized the use of their trademarks, and consequently asked for the ads to be pulled. As experiential futures designer and theorist Stuart Candy notes in his analysis of the issue:

> Patrolling IP in this context is effectively policing thought. Which is insidious enough in any form, but the stakes somehow come out in sharper relief when it comes to curtailing expressions of possible futures. It could be said that the IOC, in exercising its copyright-holders' veto, is literally curtailing the public's ability to imagine a future in which a now-conflicted region turns things around to the extent of becoming Olympics-ready (2008).

Eventually, and under protest, Saatchi and Saatchi and the University of Ghent eventually pulled the ad. As is painfully clear in this example, and the many others like it,[61] if people cannot use common language to imagine and express alternative futures, then the idea of the "future as a commons" is obsolete.

Free speech issues were elided in these examples because, in the domain of the law, these were matters for the private world of property and contracts. The movement from public to private law opens the door for the migration of words, images, or phrases from our common reserve to the private estates of those who, with the right skills and resources, can claim these resources as their own property.

Boyle calls this a "Homestead Law on the English language" (1996, 146) and further emphasizes what is at stake:

> A free speech discourse that imagines the only threat to vigorous public discourse is direct censorship by the state is blind to the multiple ways that state-granted property rights fence off the public domain, even directly restrain certain kinds of speech (1996, 148).

This public language is what we use to create and to share sensibilities. Author Jonathan Lethem makes the critical point that "appropriation, mimicry, quotation, allusion, and sublimated collaboration consists of a kind of *sine qua non* of the creative act, cutting across all forms and genres in the realm of cultural production" (Lethem 2007, 61). In this production people fashion works for public consumption, but more fundamentally this production is also is part of our personal and collective self-fashioning. And finally, when applied to neuropolitics, the availability of a free and open language is essential to both social coordination and collaboration. It is the open source code necessary to write the software of the mind (Clark 1997, 194-201).

Enclosing memory

Similar to how open access to language is a prime tenet of free society, open access to the collective, shared history of life, and the ability to reconsolidate memories from a reservoir of available materials is fundamental to a free society. Yet, copyright law often closes off access to (or places a toll booth in front of) the recordings, writings, and other hypomnemata[62] of humanity's recent cultural heritage. When writer Alice Randall wrote a novel based on characters from the "Gone with the Wind" universe, but told from the perspective of the slaves in the story, the estate of Margaret Mitchell, the original work's author, sued Haughton Mifflin, Randall's publisher. After an immediate lower court injunction stopped publication, an act later called an "extraordinary and drastic" violation of the First Amendment by the 11th

Circuit Court of Appeals in Atlanta, the case became a lighting rod both for critics of the expanding scope of copyright as well as for those who sought some clarity on the boundaries on "fair use." Haughton Mifflin eventually settled the lawsuit with the Mitchell estate by agreeing to make a financial contribution to Morehouse College, and the book was later adorned with the phrase "an unauthorized parody" (Kirkpatrick 2002).

Stories of enclosure of what is generally considered part of public history foreground the question of "Who decides what cultural history and which personal memories people are authorized to use as they see fit?" If we take Andy Clark, Edwin Hutchins, and the other proponents of cognitive parallelism literally, as demonstrated throughout this dissertation, then the bits of mind and life offloaded to Facebook, Google, and other platforms that store data "in the cloud," on servers owned by these companies, are not metaphorical, but literal traces of one's extended memory. When a person reviews the images, status updates, and links she has saved on these sites, she is firing up a functioning cognitive system.

These digital cognitive extensions create novel power dynamics. In the analog world, when one accessed written diaries and photo albums he was also booting up an extended mind, but control of the "data" in these books remained with the user exclusively. Moleskin notebooks don't come with a terms of service agreements (yet). But now, in exchange for access to new applications that capture, organize, and share our lives, people are signing over the rights to large chunks of their extended minds to Facebook and Google programmers, managers, and lawyers.

When Andy Clark tells the story of the time he lost his laptop, he compares it to having temporary brain damage, noting, "I was left dazed, confused, and visibly enfeebled—the victim of a cyborg equivalent of a mild stroke" (2004, 10). The potential for large segments of the population to share in Clark's

experience is increased by the fact that not only are people offloading more and more cognitive functions to their machines, but now the machines themselves are offloading more and more of their (and thus our) functions to other machines—networked "cloud" servers scattered all around the world and predominantly owned by multi-national, multi-billion dollar corporations. Some of these corporations have capricious CEOs with their own vision for how user data will be "protected" and traded. Other companies will seek to sell-off or shut-down underperforming sites, relegating gigabytes of user history to the digital scrap heap, as when Yahoo! threatened to shut down delicious.com, a popular bookmarking site (Ha 2010). And potentially even more concerning are the viruses and "bot" networks that are controlled by anonymous groups of hackers. As many technology observers have noted, the Conficker Worm now controls the world's largest cloud computing network (De 2010).

The capacity and legal right to arbitrarily shut down a site or block a user's access to his or her own content certainly demonstrates a kind of neuropower that is unprecedented in history, and massive in its potential effect.[63] Although it may seem slightly sensationalist to say, but the argument is reasonable, that Internet and software companies, as well as skilled and motivated hackers, have the power to inflict mass brain damage upon their users.

Enclosing ownership

When lawsuits threatening punitive damages, cease-and-desist letters, strategically biased international treaties and other devices from the public sphere of law are inadequate for the task of complete dominion over content, then some companies and artist groups are not reluctant to seek out other means. Taking patent and copyright from the public sphere of law, and moving it into the private sphere, is done by several tactics, touched upon

above. The most common way is the move from selling products to renting or licensing products. In this arrangement, the full rights of ownership remain with the licensor.

These private contracts, in the form of "shrink-wrap"—packaging that when opened seals the contractual agreement between the user and the licensor— or through End User License Agreements (EULA)—the ubiquitous "do you agree" forms that are generally ignored by users before clicking yes, put legal limits on what a user can or cannot do with the products that they have paid for. Digital surveillance tools included in the software ("spyware") have also often become part of the bargain, as companies seeks ways to ensure that they know if and when any contract terms have been violated, and if a termination of the license (by means of deleting the software from the user's computer) is necessary. Sony's infamous "rootkit," a Digital Rights Management tool included (unbeknownst to users) in music CDs the company sold, caused operating issues and opened up a "back door" for other malicious software to infect a user's computer.[64]

Almost all of the software and much of the digital content consumers "purchase" for their computers and mobile devices is, in reality, only licensed to individual users. Generally, in the case of software, licenses prohibit users from copying, sharing, loaning, or "reverse engineering" the product (Halbert 1999, 61-64). These are actions consumers are used to doing with other products they buy, especially with material goods, like books or lawnmowers. The net effect of this is to constrain experimentation, and thus to constrain freedom, extending more control of the suppliers over the users.

Sharing and tinkering with products are not only easier in the digital world, but most people consider them harmless. Copying or loaning of software, or the trading of music files, does not affect the original copy—it is an inexhaustible resource. Of course, content and software producers see these

activities as harmful to their potential sales, an argument that makes sense abstractly, but is backed by ambiguous, incomplete, or occasionally falsified data (Parrish 2010).

Convincing the public to use software and content in the manner permitted by the content owners has been difficult. While we may be facing "the most significant regulation of culture that our free society has ever known" (Lessig 2004, 170), no amount of money spent on PR, or Boy Scout badges, or punitive lawsuits have been able to significantly change the way humans create and share information, including digital content. The nature of digital content and information, and the way we interact with it has caused the "gap between copyright law and [cultural] norms to only grow wider in recent years" (Tehranian 2007, 546). Becoming a nation of constant infringers turns regular people doing regular activities into criminals, and undermines the trust and confidence citizens have in the logic of the laws they are to follow.

There have been, however, several innovations in recent years that attempt to bridge the gap between cultural norms and IP law, especially those that use the adhesion of licenses for the cause of open access and user freedom. The godfather of these user-empowering licenses is the General Public License (GPL) that came out of the decades old "free software" movement. This movement is based on four basic freedoms:

- the freedom to use the software for any purpose,
- the freedom to change the software to suit your needs,
- the freedom to share the software with your friends and neighbors
- the freedom to share the changes you make.[65]

The General Public License codifies these freedoms and binds signatories to abide by these rules.

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Another user-empowering licensing regime comes from Creative Commons, a non-profit organization that supports the creation of "legal and technical infrastructure that maximizes digital creativity, sharing, and innovation.[66]" Creative Commons licenses provide turn-key ways for users to balance certain kinds of activities, like open sharing of content but with some protections, like stipulating only non-commercial uses are allowed. Since their release in 2002, Creative Commons licenses have become extremely popular, with hundreds of millions of users relying on creative commons licenses to protect, legalize, and generally clarify the kinds of uses that are allowed for the content they produce.[67] As these alternative property and licensing regimes become more mainstream, one-size-fits-all policies, like the ACM "work for hire" policy, might become harder to justify and harder to deploy without resistance.

Enclosing enforcement

As this chapter has argued, licenses, lawsuits, and other mechanisms for legal enforcement of intellectual property are both complicated and often ineffective. Tracking the activities of millions or billions of users and stopping the flow of information across global digital networks on a case-by-case basis, as most legal interventions require, also makes this kind of enforcement difficult to implement. So, content producers and providers seeking to move closer to the goal of perfect control have begun to take matters into their own hand by directly locking out users from their products. These tactics, like Digital Rights Management (DRM) software and Content Scramble Systems (CSS), create an unprecedented "level of control for proprietary culture" where "permissions will not longer be policed by the courts or the law but rather by software codes" (Lessig 2004, 279-280).

This change in strategy to use technological means to embed control both into the platforms and the devices they operate represents another extension

of control over our cognitive ecology, one that transfers power, yet again, from the public to the private domain. It seizes agency from users, or from legal oversight and wholly integrates a control mechanism directly into our mental furniture. Tarleton Gillespie, a Cornell Communication Professor, an expert on the tools content providers use to wire devices shut, making them impenetrable to the tinkering hands of users, has criticized the move to "effectively frustrate" consumers (2006). Besides usage compliance being embedded into technologies, he notes, there is also a growing mandate for anticircumvention and "robustness rules." These rules, included in "anti-piracy" bills that have been proposed and circulated in the U.S. Congress, would "obligate manufactures to build devices such that they prevent tinkering—not only must the technology regulate its users, it must be inscrutable to them" (2006, 652).

Intellectual property law needs tools such as fair use and noncommercial use in order for experimentation, innovation, and creativity to take place. Indeed these IP gray areas are necessary to promote the progress of arts and science, and are rendered irrelevant if the individual agency necessary to test these boundaries is technologically preempted and prevented. These techniques are creating a world of "user-subjugating software" as Free Software advocate Richard Stallman warns (1999). Siva Vaidhyanathan also fears this enclosure of freedom, where "home computers would be governed by remote control" (2004, 76). Are people really comfortable with allowing the remote governance of their extended minds? Is this the world we want?

Conclusion: Enclosing the Future?

This chapter has explored the role of intellectual property in the governance of the extended mind. But it has also examined the ownership and colonization of the thinkable, for current and future generations. In his recent

book, *Where Good Ideas Come From*, science writer Stephen Berlin Johnson explains the concept of the "adjacent possible" (2010). This theory of evolutionary change first espouses by complexity theorist Stuart Kauffman shows how at each level of complexity for life, there is a finite, but new, set of possible directions that are opened up. A single-celled organism cannot jump up and walk on two feet, but as new adjacent spaces are opened up by millions of years of mutation and selection, possibilities expand—eventually ones that include the possibility for legs and feet, and the ability to walk upright on two of them. Some possibilities that exist are not chosen or are not viable in the long term, and other seemingly modest changes open up entire new possibilities that could not have been predicted from the characteristics of prior forms.

Johnson uses the image of walking into a square room with three new doors on each wall. Choosing a door opens you up into a new room with three new doors, each leading into different possibility spaces, and on and on. In terms of creativity and innovation, modern humans have had a good measure of choice about which doors they'd like to open. But if we now imagine this room as our cognitive ecology in a world of heavy intellectual property protections, we can see a guard at each of the doors. Much like Kafka's parable of the man "Before the Law" who dies after waiting his whole life for the guard to let him through the door of the law, each of the doors of the cognitive adjacent possible are closed before us. The first door is locked behind legal walls; the second door is technologically wired shut; and the third door is blocked by the invisible force-field of self-censorship.

New sensibilities and new opportunities exist behind those doors, and people need to be able to open them. Allowing legacy powers and incumbent hierarchies to keep people locked in this small room will crush the creative spirit that is necessary to push humans beyond their narrow view of life, and will thwart the exploration into new ways of being. We might not have been

able to pick our brains, but we must be able to re-design our extended minds. A fair, open, and future-oriented intellectual property regime will aid in that process; a repressive control-oriented one will not.

Chapter 5: Designer Governance

A Design Challenge for Governance

Neuroscience and neurotechnologies are challenging the fundamental assumptions upon which most modern constitutional governments were first designed, and have the potential to revolutionize the practice of governance as we know it. There are few domains that will remain untouched by our increased understanding of the human brain and expanded capacities to modulate the human mind 'in the wild.' Brain and mind sciences (including research from neuroscience, cognitive science, philosophy, psychology, the social sciences, and design) have helped usher in the neurocentric age (Zimmer 2004). This is an era in which worldviews, guiding metaphors, self-identities, dominant values, power relations, and notions of truth are predicated on new knowledge about the brain and the mind (Dunagan 2010).

Even conservative institutions and relatively slow-moving industries are re-orienting themselves around research and insights from neuroscience. In medicine, for example, the entire paradigm of health and wellness in the 20th century shifted in response to advances in understanding the heart and vascular system. This orientation not only improved clinical medicine, but it changed many of our habits and our thinking about exercise, nutrition, stress, and a range of behavioral and institutional practices. If the 20th century was the century of the heart, 21st century medicine looks to be defined by brain health (Reichman 2010).

Clinical understanding and treatment of brain-related conditions, from neurodegenerative disorders to psychological health, are advancing rapidly. "Cognitive fitness" and brain-healthy nutrition and exercise guidelines are

becoming widely accepted. Because the brain (and the mind it enables) are the foundations of our humanity and sense of self, the personal, cultural, and political impact of neuroscience will be even more transformative than it has been for the heart. Indeed, as Harvard medical anthropologist Paul Farmer notes, much of the practice of government over the last century can been viewed as, "medicine on a grand scale." (quoted in Olson 2008). The fundamental questions about who we are as human beings and how we are to order our society effectively are being answered with knowledge and perspectives that are unprecedented in human history.

This paper begins by tracing how models of cognition and human nature formed the foundational design logic (and design constraints) for almost all of the "constituted" political entities of the last 230+ years, with a particular focus on the design of the U.S. system of government. It then looks at some of the advances in the brain sciences that have expanded, and in many cases overturned, our common beliefs about how the brain works and notions about "human nature." These include the re-imagining of the bounded, independent individual, the assumption of human rationality, and the human capacity for foresight.

Next, it analyses the conditions and new design dilemmas generated by an emerging neurocentric governmentality that takes the brain and the extended human mind as a "legitimate terrain of contestability" and as a battleground for control (Connolly 2002, 57). From there, it lays out four alternative futures for governance, with an examination of the ways power might respond to these changes and how basic political structures of government, in particular U.S. government, could evolve within several possible neurocentric worlds.

Cognitive models, "human nature," and the design of the Constitution

How we think about thinking has material effects on the way we design political systems. Political design is built on a foundation of cognitive design. As philosopher John Searle argues:

> In order that something can be money, property, marriage, or government, people have to have appropriate thoughts about it. But in order that they have these appropriate thoughts, they have to have devices for thinking those thoughts, and those devices are essentially symbolic or linguistic (2007, 95).

The Enlightenment was a historical period when new philosophical and political devices generated revolutionary thoughts, and were joined with technologies (like the printing press) to disseminate those thoughts to activate larger publics. There may be no better single act representative of the Enlightenment than the conscious constituting of a new political system (Warren 1928). For a new form of government to even be 'thinkable' required a profound epistemological rupture, and to *claim the right to design a new system* is as revolutionary an act as has been seen in history (Rakove 1996).

And in true Enlightenment style, this re-design of government began with the reductive examination of all the first principles about ourselves as individual human beings, and as groups of people living together on a finite planet. While post-enlightenment critique challenges many of the universalizing attempts of this kind of grand design by a group of entitled white men, nevertheless the design of the U.S. Constitution is remarkable for its originality and continued resilience over the centuries.

Political design can be seen as a process to operationalize certain values and visions for a desirable society. Reliably reproducing these values in practice

is guided first by the overall belief system, or worldview, of the designers. This includes cosmological beliefs about the nature of the universe, sociological beliefs about the nature of human communities, economical beliefs about the way goods, services, and energy are valued and exchanged, psychological beliefs about the nature of human thought, emotions, and perception, and philosophical beliefs about the nature of good and evil (Dator 1998).

The constellation of ontologies and historical circumstances transforming much of the world, especially North America, at the end of the 18th Century enabled the creation and ultimate acceptance of the Constitution in the U.S. (Jensen 1964). While the crafters of the Constitution cannot be defined by monolithic beliefs, by and large, they saw the world as a cosmic machine built by an intelligent, but unknowable, creator. This universe could be modeled with great precision, given the right tools to measure it. It was intelligible, predictable, rationally organized, and beautiful. A political system with the right intellectual foundations and structural scaffolding that could closely reproduce this mechanical craftsmanship would also aid in the ongoing improvement of government and human society (Robinson 1957).

An institutional aid to the perfectibility of man was absolutely necessary, for if the universe was a beautifully designed clock, humans were often the gunk that fouled the gears. The prevailing religious and philosophical beliefs of the times tended toward the view that people were inherently selfish, greedy, corruptible, and if left to their own devices—evil (Dator 2006).

Within the network of architects, lawyers, natural philosophers, writers, engineers, surveyors, and activists who first entered into this bold experiment in governance, there was much less agreement about the nature of the human mind and human behavior than that of the nature of the universe. There was no "science of the mind" to equate to the science of

things in Newton's *Principia*. Or, to put the development of neuroscience into historical perspective, Newtonian mechanics was then already over 100 years old when the Constitution was being written, but the pseudo-science of phrenology wouldn't come into vogue for another 100 years after it was written.

The debate concerning "human nature," however, did not suffer in passion due to lack of philosophical consensus or rigorous scientific investigation. Folk psychology, religious mythology, over-generalized observations, and armchair philosophy were the dominant epistemologies. Political psychology and philosophy, as American Political Science Association President William Bennett Munro described it in a 1927 address, lived in (and indeed might still live in) "the sublime cloudland of the *a priori*" (in Becker 1991, 9).

Systematic study of how humans actually behave was still rare, and the neurological underpinnings of our mental capacities, including the role of emotions in decision-making processes was largely unknown, or purposely avoided (Gewirtzman 2009). Formal and informal discussion about human behavior included a mix of philosophies and methodologies. From Descartes came the view that consciousness is necessary for existence; from Aristotle the notion that thinking made us different from other creatures—made us the "political animal." Machiavelli taught that the masses *might* be able to reason, but they need to be controlled by the careful composition of political artistry and fear. Hobbes and Rousseau were cast in a conflict between the essential savagery or the essential goodness of people, and the role of institutions in saving or alienating us from this essence or nature. John Locke extolled the inalienable rights of the individual, and the foundational possession of the self as the originating principle of political subjectivity. And insights from other ancient, medieval, and enlightenment thinkers from Thomas Aquinas to Voltaire colored the all-important paradigms and metaphors used to understand the essence of humanity (Horwitz 1986).

But perhaps no other view held as much weight as that of Adam Smith, the Scottish economist and philosopher (Smith 2004). He argued that humans were rational self-maximizers. Greed, corruption, and selfishness could all be expected because the most rational thing anyone could do is protect their own interests. It must be noted, however, that Smith also wrote about the importance of empathy and "fellow-feeling" for the proper functioning of society (Smith 1759)[68] but that view did not dominate the operational concerns of the designers. Smith's philosophy, and his solutions to this dilemma, differed from previous models in that he did not wish to repress by force this tendency to selfishness, but instead to *balance* greed against greed for the greater good. Smith was an early social architect. His approach offered a new way to think about the design dilemma of the inherent selfishness of people, one in which wrongs can be righted by the proper ratio of force against force.

But this proper ordering required certain kinds of minds—minds that were direct, rational, and consistent. Any incursion of emotion into the cool rationality of thought could poison the social, economic, and political functioning of the system (Gewirtzman 2009). While in theory, "all men were created equal," the necessary kind of assertive rationality that enabled power, and gained one access to public life, was not equally held. As feminist scholars have argued, "power is associated with agency, and agency with masculinity" (Monopoli 2006, 2644). Women, non-white races, and the lower classes did not have the capacities to control their emotions, nor did they have the discursive power to abstract their bothersome bodies from rational thought. Therefore they could not be expected to participate in democracy in the same way as educated white men—men who were also to be burdened by the responsibility to be representatives, guardians, and masters of these emotional subordinates.

So, here we can enumerate the basic conditions and constraints that needed to be addressed by the designers. The fundamental political unit was the individual. This individual, if he was a wealthy, white man, was a rational, self-interest maximizer. If the individual was not white, educated, and male, then he or she was likely irrational and incapable of participating meaningfully in society. Citizens lived in one of 13 colonies and wanted representation in the federal government and the protection it provided, but freedom from its control as well. The universe was a giant clock, that could be known and its behavior predicted consistently if properly understood. Institutions, like people, could aggregate and abuse power, and must be properly restrained. Freedom, liberty, equality, and opportunity were the core values to be operationalized within the design (Becker 1991).

And we know how the design goals and constraints were addressed: a federalist system with distributed power between three branches of government, and between the Federal government and the states; a representational system where rational men were elected to rationally debate the important issues of the day on behalf of their constituencies (the people—House of representatives, and the states—the Senate). The Executive Branch was to have a singular head, one with the proper agency and power. One that early framers like Alexander Hamilton considered essential "to protecting the young nation from internal and external threat" (Monopoli 2006, 2643).

The design of the Constitution rested on the view of humanity as essentially selfish, emotional, and power-hungry (McGuire 1988). It was a design to minimize the risks of human failings through careful temperance of extreme positions, the balance of aggressive ambition, and both the distribution and series of checks on power (Kelly and Harbison 1970). It was meant to be orderly, predictable, and stable, yet flexible enough to accommodate changes. While the basic design might have been stretched to the breaking point at

several occasions in U.S. history, the core scaffolding has held through to this day—and is the framework of almost every other "constituted" society since (Wheeler 1975).

But we know many, if not most, of the core assumptions that informed this design were incomplete at best, and completely wrong at worst. The mechanistic cosmology of the Newtonian universe has been shown to be only a sub-set of a more fundamental, yet quite strange, physical world. Predictability, objectivity, and basic notions of cause and effect have been complicated by irreducible uncertainty, observer effects, and action-at-a-distance. Evolution, thermodynamics, and quantum physics have revolutionized our understanding of the physical world, and point to new models in which to think about governance (Becker 1991).

Theories of mind and human behavior have also undergone several revolutions. Freud deconstructed the unity conscious mind into three often battling entities. Behavioralism and conditioning research showed how our actions could be programmed and predicted from how we design certain environments. And now we see a cacophony of new models of the mind built on advanced neural imaging technologies that can see a live brain in action, computational models of how cognition works, and functional definitions of the extended and distributed mind (Gardner 1987, Hutchins 1996). If we are to re-form or revolutionize our structures of governance to meet the challenges of the 21st Century while upholding our preferred democratic values, we'll need to understand the human mind and human behavior intimately, and incorporate these new minds into the design of appropriate brain-governance interfaces.

Re-defining the brain and re-mapping the site of politics

The human brain will be a principle site of political and social contestation in the 21st Century. As political theorist Andrew Murphie notes, "politics… is increasingly colonized by a rapid cultural propagation of cognitive models and practices" (2005). Besides the biological and material disputes—from edge-of-life policy issues to mental surveillance to resource debates about cognitive enhancement and cognitive rights—the very definition of the brain and the mind will make a difference to how we govern ourselves. The developments in the brain sciences are overturning our common sense notions about how thinking occurs, where it occurs, and *who* exactly is the thinking agent. This disorientation and continued displacement of our sense of a unified self creates a distinct challenge for us to not only govern, but as Katherine Hayles argues, it will even be a "struggle to envision what will come after the fracturing of consciousness" (2001, 15).

New insights from neuroscience have exposed many of our common misapprehensions about the brain and mind. If political science, psychology, and philosophy were once comfortable in "the sublime cloudland of the a priori," they are now groping their way through the labyrinthine folds of the infinite cortex. The number and diversity of theories about how the brain works have certainly not been reduced by our increasingly detailed and sophisticated knowledge.

It is not surprising in our world of abundant data and information processing, that an increasingly popular view of the brain sees it as a highly complex computational machine—running trillions of compute cycles through its biochemical processors. An author in an NSF-funded report on human enhancement technologies makes this viewpoint clear, arguing that today "the fulfillment of the Socratic adage 'know thyself' can now only be

achieved through man's interaction with and dependence upon computing systems" (Johnson 2002, 208).

Biological brain functioning can be turned into data, and this data used to simulate neurological processing. This computational view makes possible the pronouncements of techno-prophets like Ray Kurzweil to predict dates at which technological computation will reach the size and speed of the human brain (2005, 111-142). And, the argument goes, we could see true machine intelligence—an intelligence that will quickly surpass "normal" human capacities. While this argument may contain a fundamental misunderstanding about the complexities of biological cognition, and is highly controversial (Myers 2010), it still holds social significance to how we frame neuropolitical debates in public discourse.

Another theory that is gaining traction in the cognitive and behavioral sciences—the one that I think will most transform our notions of thought, agency, and individuality—is the theory of the extended mind, including notions of distributed and situated cognition. The "extended mind" perspective sees cognition as a process involving complex brain, body, and world feedback processes, including other people, technologies, and the built environment (Clark and Chalmers 1998, Clark 2004, Hutchins 1996). While still outside the mainstream, this theory of mind is being actively supported and developed by a growing community of cognitive scientists, philosophers, neuroscientists, behavioral scientists, and cognitive anthropologists.

Lambros Malafouris, a Cambridge University cognitive archaeologist who has been investigating the connection between brain and world (the brain-artifact interface), provides a very succinct, but profound, definition of the brain:

> the human brain...is an extremely plastic, profoundly embodied, materially engaged and culturally situated bio-psycho-social artifact (2010, 265).

Each one of these clauses contains a key insight into cognition as a situated and distributed process. The adjectives are important as well. First, the brain is *extremely* plastic: it is biological system made to adapt over time, and throughout life. The brain is *profoundly* embodied: it is not merely carried in the flesh, but is intimately linked to the biochemistry, sensations, and dispositions of the body. The brain is *materially* engaged: thought often occurs in conjunction with the physical objects in our world—from the pen and paper we use to record our fleeting thoughts to our extended memories carried in our digital devices. Next, the brain is *culturally* situated: the habits of perception and thought are embedded in the brain through our language and patterns of behavior we inherit from our culture and install in our selves. Finally, the brain is a *bio-psycho-social* artifact: it is a creation or construction born of our biological affordances, our psychological characteristics, and our social experiences and habits of perception. The brain, as we know it, is a product of what we've inherited form biological evolution, and the ways we are actively "spending" that inheritance (Malafouris 2010).

The theory of the *extended* mind is built, first and foremost, on our better understanding of the *unextended* brain, i.e. the happenings going on inside our biological gray matter. The brain sciences have exploded in recent years, moving from a marginal scientific endeavor, into "a mature and stand-alone discipline, comparable to physics or chemistry, economics or law, molecular biology or medicine" (Rosvall and Bergstrom 2010). Neural imaging technologies have been instrumental in this advance. EEGs, CAT scans, PET scans, and especially functional magnetic imaging (fMRI) have allowed us to peer inside a working brain with ever-greater resolution. We are seeing just how the brain works when it is thinking, feeling, and interacting with the

world. It is this ability to understand the brain *qua* brain that is showing us just how essential our bodies and technologies are to how we think.

Importantly, we are seeing how we represent the behavior of other people at a neurological level. This high-resolution view is different from our common sense beliefs. We like to think we judge people fairly, based on their actions. But, studies have shown that we often make judgments based not on people's actions, but on our *perceived intentions* of those actions. As Brian Knutson, a researcher of situated cognition notes, "what we think others are intending is what really matters," and *how we frame an event, he adds, "*changes the test subjects' neural reactions" (quoted in Gorlick 2010).

We are also beginning to understand, from a neurological point of view, the previously unseen impact of our environment on thinking, and the kind of thinking that is encouraged by certain kinds of surroundings. We are beginning to understand how living in a city, taking a hike in the wilderness, or even the height of ceilings can significantly change the biology of thought (Dunagan 2010; Ackerman, Nocera, and Bargh 2010).

The extended mind is a way of looking at how a mind is shaped by the things around it, to see mind and thought as existing within a cognitive ecology. It is an approach that breaks from the "independent, isolationist" view that says: the brain makes the mind, and that while the mind uses the world, it is functionally independent from that world (Clark 1996, 194). There have been inklings of this view throughout history. Friedrich Nietzsche, for example, recognized how the tools he used to express himself color the way his mind works: "our writing equipment takes part in the forming of our thoughts" (quoted in Nyiri 1993). More recently, cognitive philosopher Andy Clark expanded upon this notion:

It is not always that fully formed thoughts get committed to paper. Rather, the paper provides a medium in which…via some kind of coupled neural-scribbling-reading unfolding, we are enabled to explore ways of thinking that might otherwise be unavailable to us (2008, 126).

Yet, the concept of an extended mind is still not the way most people think about how the brain and mind work, and there is little-to-no evidence of this view in the design of the structures of law and government. Many still see the mind and material objects as independent components that may or may not work together, but are not a functioning "unit." However, with the increasing connectivity between our minds and machines, and the blending of online and offline reality, the need to make an abstract argument about thinking-as-a-system may be reduced by the everyday personal experience of cognitive co-mingling with technologies (Bohm 1994, Clark 2004, Small and Vorgan 2008). When it already feels like thinking is done *with* machines, a cognitive philosophical explanation becomes unnecessary.

So, how does one begin to think about designing or re-designing governance in light of the new ways brain scientists are defining and modulating the brain?

Foundations for Design

A re-thinking of thinking is necessary for effective governance. Governance is the process of guidance and control—a dynamic structure of institutions, culture, and behavioral patterns leading ideally towards fairness, prosperity, and better futures for all. The nature and extent of the legitimate role of govern*ment* has become synonymous with public understanding of politics itself. But an expansion and re-orientation of governance (by way of a neurocentric shift in governmentality) is occurring, one that sees

government as a meaningful part of our cognitive and perceptual scaffolding (Murphie 2005, Dunagan 2004). Governance today also concerns the generation, distribution and protection of vital cognitive resources.

With these stakes in mind, what are the issues, challenges, and opportunities for neuroscience-informed political designers to address? There are certainly many more neurocentric design issues than can be addressed here, but this section offers a survey of the kinds of questions and possible insights that are relevant for those seeking to create new forms of governance.

Individualism

In almost every political system on the planet today, the most fundamental unit of governance is the single, bounded, individual. William Bennett Munro, in his critique of the atomistic individual from a "new physics" perspective, argues that:

> the American philosophy of government has exalted the individual citizen beyond all reason...hence it is the national habit to think of social control and individual freedom in terms of hostility to each other, whereas it is only through the one that the other can be realized (quoted in Becker 1991, 4-5).

Theorists from across disciplines too numerous to mention have decon-structed the figure of an independent, self-contained subject. The new science of the brain makes similar claims (Hutchins 1996, Clark 2008, Chemero 2009). Conscious perception and thought is only a fraction of the total activity of the brain. There are, in fact, many mental systems functioning within what we generally call a single mind. As neuroscientists Michael Gazzaniga and Joseph LeDoux observe, "the mind is not a psychology, but a sociology, being composed of many submental systems" (1978, 151). Memory, emotions, the autonomic system, and the "verbal" mind called

consciousness each has its own way of doing things. The "higher" mental functions seek consistency and predictability from the lower systems. However, the communication between these systems is not always perfect, and often not moving in the direction that we think it is.

For example, much of the common sense "feeling" of a self, and the decisions that are thought to be made by the will, may in fact be the product of other neurological systems (Damasio 2000, 3-32). Psychological experiments and studies of patients with brain injuries or neurodegenerative disorders have shown that many of our choices occur below the threshold of consciousness, and our conscious mind then makes a justifiable story about why this decision was made (Norretranders 1999). In other words, our notion of "free will" may be a convenient illusion to help us maintain a sense of unity and personal autonomy.

Even the sense of embodiment and physical coherence is highly malleable— and subject to "tinkering." V.S. Ramachandran, a neuroscientist who has studied "phantom limb" syndrome (wherein amputees report feeling sensations from the amputated limb), has shown how within just a few seconds, we can radically alter our sense of bodily boundaries, and even integrate prosthetic limbs into our body map (Ramachandran and Blakeslee 1999).

In a dramatic set of experiments, test subjects' feelings of bodily wholeness are manipulated, and they made to believe that a rubber hand is actually their own. When this rubber hand is slammed with a hammer, a distinct biological and neurological fear and pain response is registered, just as if the hammer was striking their own hand (Ramachandran and Blakeslee 1999, 59-60). The point of this and similar experiments is to show that humans need persistent and precisely timed feedback between bodies, senses, and brains in order to maintain an integrated sense of a physical body. If the

feedback loops between brain, body, and world are disturbed (intentionally or not), that holistic sense of self can become disconnected very quickly.

Even in virtual space, we have an incredible ability to re-map our sense of embodiment, and maybe even more surprising, our basic self-identity. Areas associated with self-judgment and reflection, including the medial prefrontal cortex and posterior cingulated cortex, have remarkably similar activity levels when people are thinking about themselves, or thinking about their virtual selves or avatars (Callaway 2010). Research has shown that people take on many stereotypical attributes of their avatars—becoming more aggressive if their avatars are bigger and taller—and even identifying with opposite genders. This "proteus effect" as Stanford researchers Nick Yee and Jeremy Bailenson call it, complicates our common notions of bounded and stable individual identities (2007).

And finally, we return to the extended mind. Not only are we re-defining what we mean by cognition and the mind, but we are actually living more and more of our lives in functional integration with our machines (Small and Vorgan 2008). We are offloading our memories and cognitive processes to other agents in the world. This distribution of cognition is blurring the boundaries of where "the mind stops and the rest of the world begins" (Clark 1996, 213). This blurring will force us to re-think our notions of individual personhood, responsibility, agency, and even what it means to be human.

In series of books and articles on the emerging figure of the posthuman, literary and social theorist Katherine Hayles has investigated the genealogy and the current predominance, within a large segment of philosophical technologists, of a computational worldview. This is a view of reality that sees existence, and in particular the mind, as an informational pattern that just happens to be "instantiated in a biological substrate" (Hayles 2006, 160). Signifying to many the coming of a posthuman existence, this free-floating

information/identity pattern could conceivably inhabit other material bodies, including machines (Hayles 1999, 2006).

Whether this view of reality holds forth, there is certainly a sense that people resemble nodes in a network, rather than as atomistic individuals exerting force against other individuals. The governance questions that must now be considered are: how does one govern when individuals are not only highly networked, but when individuality is spread throughout the "cognisphere?" Where are responsibility, agency, and subjectivity located when "distributed cultural cognitions [are] embodied in both people and their technologies," and were does power intervene? (Hayles 2006, 160).

We have very few legal or political structures for dealing with this kind of distributed agency and responsibility. Some of the conceptual ambiguity of corporations, for example, was "solved" by the legal fiction of artificial personhood. In other words, an organized group of people whose agency and risk are distributed and limited, is made to fit the procrustean bed of individuality so that it could be contained within existing legal and political structures (Hartmann 2002). It remains to be seen whether individuality as the basis of legal recognition will be able to hold up against the novel forms of distributed, posthuman personhood that lurk over the horizon. Nevertheless, understanding collectivities, within and among individuals, will be a key political and legal design challenge in the coming decades.

Rationality

In the course of normal human behavior, people weigh the cost of their action (or inaction) against the benefits to be gained to determine the course of action that will maximize benefit and minimize loss. This is a central tenet of Rational Choice Theory, and is the official view of behavior that drives

many of the economic, political, and sociological models in use today
(Amadae 2003).

However, entire publishing cottage industries have been maintained by the
attempt to contest and to debunk the ubiquity of rational actor theory
(Lehrer 2009, Ariely 2010). While a rational, self-interest maximizing subject
might be useful for building very clean economic and political behavioral
models, in the wild and wooly world of actual human decision-making, things
look very different. Our rational minds are often hi-jacked by conflicting
emotional triggers. For example, we are often very irrational when it comes
to statistics of risk. If given $50, we are much more likely to choose an option
that says we can keep $20, rather than one in which we are to lose $30,
although the ultimate result is the same. When we are given choices that
involve risk of loss, our amygdala fires, generating feelings of fear and
aversion (Lehrer 2009, 105-107). But this fear response can be managed by
conscious effort, when we use our prefrontal cortex to overcome the initial
rush of emotions and think things through logically. Nevertheless, these sorts
of metacognitive skills to overcome an "illogical" rush of emotions are
inconsistently applied by humans in everyday contexts, and cannot be the
guiding behavioral model we use to design systems.

While there are situations in which it is beneficial to control our emotions,
we certainly cannot make decisions without them. Neuroscientists have
compiled compelling evidence about the essential role of emotions for
producing thought, and as a complementary partner to reason for most
decision-making situations (Damasio 2006, LeDoux 1998). Embodied
emotions are not a superficial add-on to reason, or something that we should
actively try to divorce from reason. Without the "feelings" that we get along
with our rational cognition, we are unable to make smart decisions. Patients
with damage to their orbitofrontal cortex, the area that connects the limbic
system to the frontal cortex (connects the emotional centers to reason), have

a hard time making decisions. Even though these patients can think and reason at a very intelligent level, without the emotional core associated with decisions, all options are "flat," and a final choice hard to land on. As NYU neuroscientist Elizabeth Phelps puts it, "pure reason is a disease" (quoted in Lehrer 2007).

Emotions are also closely linked to our surrounding conditions, and impacts our moral reasoning as well. Thinking, including moral judgment, is highly influenced by the symbolic or metaphorical framing from the linguistic or environmental context. Cultural psychologist Jonathan Haidt and his colleagues have developed and intuitionist model of moral judgment, in which he posits that most moral judgments are non-deliberative, automatic, and might otherwise be called irrational (Haidt and Bjorkland 2007). What one might think of as a free and independent will, is in fact a tempest of thoughts and feelings, a landscape bombarded with subterranean cues from the surroundings that color perception of events and even people.

Wall colors, ceiling heights, stiffness of chairs, coarseness of materials, and even odors literally make us see and judge the world differently (Ackerman, Nocera, and Bargh 2010). In a provocative demonstration, researchers introduced foul odor into a room in which volunteers were to read a set of morally ambiguous scenarios (laws allowing first cousins to marry, for example). Volunteers in the rooms in which the foul-smelling odors were introduced were much more likely to judge these situations more harshly and prohibitively than those in the control group. In other words, the feeling of disgust was associated with harsher value judgments (Schnall, Haidt, Clore, and Jordan 2008).

The physical locations in which judgment and thinking take place, from courthouses to the oval office, must be re-considered for the effect these spaces and conditions within them have on the kind of thought that is

installed there. Ultimately, we cannot make artificial barriers between thinking and feeling, or thinking and our environment. And we certainly cannot build structures of political participation around the notion that completely rational thought is a prerequisite to public discourse. Observation of how political discourse actually occurs would quickly absolve one of this notion, but neuroscience is confirming the key role of emotion, associative logic, framing, and other ways our brains surf the edges of rational thought. We need emotions in order to think, but we also cannot let emotions "run wild" either—they need governing. Governance can become an augmentation layer for deliberation and choice—tempering, but not exiling, emotion from how we make decisions.

Power and empathy

One assumption about human behavior that has held up rather well since the beginning of political philosophy is that "power corrupts." But this truism, while confirmed countless times throughout history, has a complex psychology—one that neuroscientists and psychologists are beginning to uncover in greater detail. While it may be taken for granted that power corrupts, the HOW and WHY it corrupts are less frequently investigated? What are the particular mechanisms and conditions that allow this to occur? What is it about our "nature" (or our nature in certain contexts) that makes those with power behave in ways we find morally bankrupt?

Psychologists Joris Lammers and Adam Galinsky have explored this question, and their main finding is not surprising. In a series of experiments that used "priming" techniques to engender a sense of empowerment or powerlessness (by asking people to write about episodes when they were in positions of power or powerlessness), Lammers and Galinsky showed that the *sense of entitlement associated with power* allows people to justify *their*

own personal otherwise immoral or unethical acts--like speeding or not paying taxes (Lammers, Galinski, Gordjin, Otten 2008).

So, power makes someone justify their sense of being "above the law," but this research brings up another very important aspect about the psychology of power—its connection to distance, and the connection of distance to empathy. Adam Smith extolled simple "human feeling" as a bulwark against the abuses of hierarchical arrangements and inequities of power. When those in power are psychologically, culturally, or maybe most importantly, physically disconnected from other people, the abuse of power increases significantly. As science writer Jonah Lehrer notes:

> Even when people have power, they remain mostly con-strained by their sympathetic instincts. However, it only takes one minor alteration for this benevolence to disappear.
>
> [In a game that placed people in the role of dictator] when the dictator cannot see the responder—the two players are located in separate rooms—the dictator lapses into unfettered greed. Instead of giving away a significant share of the profits, the despots start offering mere pennies, and pocketing the rest (2010).

This raises important issues for the design of political, legal, and economic systems. Lehrer continues:

> Once we become socially isolated, we stop simulating the feelings of other people. As a result, our inner Machiavelli takes over, and our sense of sympathy is squashed by selfishness. The UC Berkeley psychologist Dacher Keltner has found that, in many social situations, *people with power act just like patients with severe brain damage.* "The experience of power might be thought of as having someone open up your skull and take out that part of your brain so critical to empathy and socially-appropriate behavior," he writes. "You become very impulsive and insensitive, which is a bad combination" (2010).

Given the current state of our representational forms of government with the relative isolation of many of our key decision-makers from their purported constituents and the forced distance of our bureaucratic structures, this insight into the dearth of empathy that arises from isolation should weigh heavily on future governmental reformations. Within the world of what is called government 2.0, social networking technologies and open access to government information have been lauded as a way for everyday citizens to interface with their representatives and officials. Often, however, "direct dealing laws" prevent public officials from talking directly with certain constituents, creating a wall of fear and further hindering necessary conversation (Goldsmith 2010). It remains to be seen whether this level of participation will carry any more democratic significance than voting or letter-writing, venerable practices with limited impact.

Foresight

Perhaps nowhere else does neurological functioning and the current system of government conspire to form such a vicious cycle than in the domain of foresight. Humans spend a significant amount of time thinking about and imagining the future; some estimate around 12% (Marshall 2007). While the ability to "mentally time travel" might distinguish human mental experience, we are notoriously bad at anticipating the results of certain actions or choices. We all think about the future, we just don't do it very well. As Daniel Gilbert, author of *Stumbling on Happiness* puts it:

> Our ability to simulate future selves and futures circumstances
> is by no means perfect. When we imagine future circum-
> stances, we fill in details that won't really come to pass and
> leave out details that will. When we imagine future feelings, we
> find it impossible to ignore what we are feeling now and
> impossible to recognize how we will think about the things
> that happen later...Foresight is a fragile talent that often leaves
> us squinting, straining to see what it would be like to have this,

go there, or do that. But if our great, big brains do not allow us
to go surefootedly into our futures, they at least allow us to
understand what makes us stumble (2006, 263).

There is a recognizable neurological basis to our limitations for effective

foresight, and our tendency to stumble toward the futures. Neuroscientists

have discovered that there is a remarkable neurological similarity in the way

we remember the past and envision the future. Recent imaging studies have

shown:

A striking overlap between the activity generated in the past
and future tasks in the prefrontal cortex, medial temporal lobe
regions including the hippocampus and parahippocampal
gyrus, and a posterior midline region near the precuneus. This
study again reveals strong evidence of overlap between the
brain systems that are used while remembering the past and
imagining the future (Schacter, Addis, Buckner 2007).

These studies reveal profound insights into how we think about the future,

and implications associated with conditions when we cannot imagine the

future. Patients with certain kinds of amnesia cannot produce coherent

visions of the future. Suicidally depressed people, for example, show a

significant decrease in their ability to remember details of their past, and lack

imagination about their futures. Children only begin to truly remember

episodes in their past around 3-4 years of age, and can only begin to imagine

their future during this stage of development (Marshall 2007).

Much like the notion that compelling 'images of the future' are necessary for

cultural robustness, neuroscientist Endel Tulving connects our cognitive time

travel with the growth of human complexity: "I cannot imagine how

civilization could emerge from brains that cannot imagine the future" (in

Marshall 2007, 37). Individuals run through personal scenarios in order to

minimize the pains of surprise. Societies, and the structures that order

society, must also perform these prospective exercises in order to prepare for changes on the horizon.

Yet it seems our governmental processes and institutions have been designed to do just the opposite—to reward short-term thinking and to punish acting on behalf of future generations, or even spending time *thinking* about them. Very short election cycles, quarterly corporate reporting, reduced windows of time for return-on-investment, and a general acceleration of change seem to be shrinking our collective horizons, and increasing the instances and severity of shock and surprise. There are very few incentives today in politics for thinking about the future, or putting long-term goals ahead of nearer-term returns. As futurist Jim Dator has observed, "the future doesn't vote and the future doesn't have a political action committee, so anybody who worries about the future too much is going to be out" (in Griffith 2005). This is a powerful statement as to why the structure of our political system allows it to be dominated by the "now." And, with budgetary pressures mounting in what may be a generations long economic decline, our systems will continue to rob from the future to pay for the present as we blindly stumble along.

Alternative Futures for Neuro-governance

The four alternative futures below portray distinct possibilities for a world 30 years out. Neuropower and neurocentric governmentality have evolved differently in each, responding to changing global conditions by incorporating new understanding and technologies from the brain sciences. The design and practice of government are built upon the structures that exist today—some core structures changing more than others. As the fundamental assumptions about people and institutions undergo shifts

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within particular historical circumstances, so too does the practice of governance.

None of these are meant to be a best or worst case scenario—some problems have been solved, and many new challenges have arisen. These futures point to ways certain values, priorities, cosmologies, visions, and technological affordances might be operationalized within society and government, and what the experience of neurocentric governance might feel like within each.

Thoughts of Mass Destruction

Following a series of devastating attacks from "home-grown" terrorists, and a dramatic rise in violent crime, the United States has expanded the role of law enforcement in the everyday lives its citizens. The new governmentality is built around the basic fact that if a citizenry cannot be protected from internal and external threats to its safety, then all the most idealistic values of government, including freedom, opportunity, equality, or even democracy, are at best meaningless, and at worst a contributor to violence, terror, and general instability. The globally connected (but simmering and precarious) world of 2030 cannot take comfort in abstract ideals as a bulwark against the actions of the destructive dissatisfied.

This is a world in which the barriers to turning hostile thoughts into violent action have been greatly reduced. Weapons (both physical and virtual) have been made accessible to individuals at a scale never before seen in history. There is no putting the genie of hate and fear back in the bottle. Any attempt to mitigate the actual motivations for violence will only work in the long-term, those with a mission to do harm now will not be swayed by a kinder, gentler foreign policy. It has become necessary, then, for responsible authorities of governance to use the most effective means necessary to thwart these myriad criminal acts.

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The new responsibility of power means recognizing and pre-empting violence at its source—inside the human mind. The wrong kind of thought, it seems, has become a weapon of mass destruction. Employing a wide array of neural imaging tools, brain and behavioral modification techniques, ubiquitous monitoring and lie detection technologies, and persuasive design strategies to exert a subtle, but constant influence over human behavior. In a state of emergency, the government becomes the collective nervous system, with the mandate and capacity to prevent violent outcomes. This strategy requires government to be one step ahead of danger, and therefore needs to use (or invent) the means to do just that.

The rapid advance of neural imaging and remote monitoring of the brain have given authorities new tools to fight crime and regulate society more effectively. Mental surveillance is ubiquitous, especially in public places like airports, malls, and city streets. The rhythms of the life and of the mind are controlled with much more precision, and setting these rhythms has become the responsibility of government. Core governmental structures and practices are beginning to shift under these new mandates.

Ubiquitous sensing and feedback mechanisms in the environment allow the government to literally embed laws in the physical world, much as law is embedded in the protocols of the Internet. Individuals cannot operate machinery without proper licensing, or if their mental condition falls out of acceptable ranges due to intoxicants, fatigue, or emotional disturbance. Children and young adults are given brain scans to determine maturity levels in order to be given a license to operate certain devices, drive cars, or even play certain kinds of video games. Drug vaccines prevent individuals from "getting high" from illegal drugs, and these vaccines are required to access many of the privileges of society—from going to college, to voting, to accessing the Internet.

This automation of enforcement has consolidated more power within the executive branch. However, there are some who argue that this concentration is a violation of a core tenet of the U.S. Constitution. Others point to the perspective of many of the founding fathers, including Alexander Hamilton, who argued that a strong unified leader of the Executive branch was vital to protecting the state from both internal and external threats. Internal and external had been previously thought of as inside or outside the State, but is now being framed as both internal or external to the individual. Power no longer stops at the borders of the body, or even the cranium.

Congress still makes the laws, under heavy guidance by the Executive, and many of these laws are automatically and instantaneously downloaded into the environment and electronic networks. The courts still rule on the cases that can't be solved by fool-proof lie detection or evidence from ubiquitous surveillance, and have been essential to justifying the re-drawing of the lines of police jurisdiction.

Most people have come to accept these seeming invasions of power as a trade-off for living in a safer society. While there are still instances of violence, life is much more stable than it was in the previous decades. Government may have more tools of surveillance and control at its disposal, but there are still democratic processes in place to remove those who abuse their power. Most people had already grown accustomed to their own lives being lived openly, and their brains becoming public. And as with any public place, there needs to be some set of rules in place so everyone can use the resources safely and effectively.

Whole Earth Mind: A Cognitive Commons Secured for Future Generations

The survivability of civilization as we have known it is very much in doubt at this point in history. Mild, incremental policy reforms and the continual pleading for people to change their individual behaviors has done little to alter humanity's destructive course of (in)action. Carbon emissions increases, global climate change, and a series of disruptions born of these environmental shifts have not been met with clear leadership. But the one hope for humanity, in spite of its institutionalized and habitual stupidity, is its collective intelligence. Human cognitive capacity is Earth's greatest resource, and our greatest hope for not only survival, but our evolution into a wiser steward of the evolution of life and the ecosystem.

A global undertaking has been initiated to coordinate and harness the knowledge, skills, and effort of human minds. This began with private citizens banding together to create targeted, ad hoc networks. These networks were built to tackle discreet, but integrated problems, such as water access and safety. They also built networks to allocate resources, using global peer-to-peer lending networks. These groups often originated via electronic social networking platforms and utilized gaming and other collective action processes to create positive change. Gaming taught many key skills, including basic methods of trial-and-error, how to expand expertise (leveling up), and how to section complex problems into small executable tasks. Engineers and technology experts put their efforts towards low-cost, portable devices that could be built on the ground. Scholars, programmers, and other knowledge workers shared their skills as well. Almost everyone felt that they had some expertise or skill that they could share with others.

Corporations have begun to take notice and are changing how they do business. This was a protective or reactive response at first, because criminal penalties for corporate crimes and actions that led to environmental destruction were made extremely harsh. Denmark, in fact, implemented a law that would ostensibly "execute" a corporation for any actions leading to human suffering or death. Additionally, consumers have learned to engage with products and media in entirely new ways. Media companies, for example, are seeing diminishing returns on feeding the masses formulaic entertainment, and see the profit potential in building interactive platforms for "entertaining engagement."

These platforms might be built around fictional worlds from sci-fi adventures, or even slap-stick comedies, but communities form around these shows to discuss issues, and in some cases solve problems embedded within the narrative. Seeing how fans dissected the mythology of shows like Lost, media companies are finding ways to put that effort to use on real-world problems. Government agencies, companies, and other groups have begun to sponsor certain content for the value of the feedback it would get from a highly engaged audience. Much of entertainment and fandom is becoming a research and development tool for society.

Governments around the world are finding ways to harness the energy and innovation from the cognitive commons for solving our most pressing challenges. The need for integrated, global approaches are finally leading to stronger international agreements—some with real teeth. Against the (sometimes violent) protests of those who see this direction as a move toward loss of national sovereignty and global governance, most countries on the planet have committed to significant changes to energy, economic, and environmental policy. However, meeting the goals of the treaties, from carbon emission reduction to standardization of measurements, is beyond the human and financial capacities of even the largest governments.

So, many governments have implemented mandatory training and service requirements for its citizens. People are given summons, much like jury duty, to join service networks based on education, interests, and skills. Training and service hours are tracked, and additional rewards doled out for exceptional work. For their efforts to contribute their knowledge, skills, and expertise to the cognitive commons, citizens in the U.S. are awarded a guaranteed income rebate of almost $30,000 per year.

People work on many practical infrastructure initiatives, such as increasing car-pooling or installing insulation in homes. Some groups are tasked with embedding persuasive design and neuromarketing techniques into the communication networks and the environment to help people make more "sustainable" choices. Others are made to troll social networks and live streaming citizen video sites to document environmental and political abuses.

In addition, the government sponsors ad hoc, dynamic groups to be the "voice" of future generations. These committees are given policy options, often in the form of virtual world simulations, and are to "live" in these worlds and comment on issues as someone from this world. This information is then reported to official agents and representatives who debate the measures.

Intellectual property has been radically re-defined as the urgency to disseminate vital innovations and information has been deemed to trump claims to a temporary monopoly on certain inventions or expressions. "Giving back to the cognitive commons" has become a rallying cry and policy focus, and the fruits of this approach bore fruit for making certain innovations affordable. However, the changing incentive structures of mandatory intellectual service and reduced IP rights have slowed innovation

in some sectors, and these policies are coming under fire as the global economy continues its decades-long decline.

Strong social groups and networked civil society have driven changes to how humans interact, and how knowledge is generated and exchanged in our hyper-connected world. These changes have been harnessed by governments who are trying to create solutions for issues arising from global climate change and the end of cheap energy. Companies have learned to adapt to a world of globally aware, linked minds and shifted business practices around these new communities and values. It is uncertain whether these strategies will avert the inertia of climate change, but no doubt the way government and business think about governing collective human intelligence has been radically altered.

The Californication of Cognition

The unnecessary intrusions of government into the free exchange of ideas, capital, and the innovation that come when ideas marry capital have finally been dissolved. Humanity's intellectual capacities have been unleashed. Markets, driven by the rapid growth of the neuro-network economy, are thriving. Social change continues to accelerate, leading to remarkable technological advances, but also a widening gap between the rich and poor, and between the cognitive elite and increasingly lagging "normals."

Governance is facilitating this world of freedom and personal experimentation. Individuals must provide their own security and absorb the risks and responsibilities of freedom, yet government still sets the rules of the game. Against some states and localities banning certain pharmaceutical enhancement and augmentation technologies, the federal government has made several legal moves to protect the "cognitive rights" of all U.S. citizens.

These rights include legal access to most enhancements, a national educational policy built around early brain-based education, some protection from discrimination against those who do NOT choose to use enhancers, and broad-based set of bio-economic policies to increase the national neurocompetitive advantage.

The recent Presidential campaign was noteworthy for the positive public response to the winning candidate's admission that she actively uses attention and sleep-reducing drugs, and the portrayal of her opponent as lacking the necessary commitment and capacity to do the job without pharmaceutical neuroenhancements. "Would you want someone with their finger on the button who can't concentrate?" A recent poll confirmed the mainstream acceptance of enhancers—showing that over half of all members of Congress were taking some form of emotional or cognitive aid, and another 20% were using neurofeedback tools to help with concentration and memory.

There is strong case that neuro augmentation technologies are creating classes of enhanced "haves" and under-enhanced "have-nots." Governments in Europe, while not moving to limit enhancement use, have heavily subsidized access to drugs and technologies for those without the means to purchase them without aid.

Schools and workplaces have become more competitive than ever. Most students are prescribed attention and focusing drugs as early as kindergarten, and businesses widely recommend employees take some form of cognitive aid and engage in brain training as part of their overall mental and physical health regime. Despite the laws meant to protect those from cognitive discrimination, the advantages of increased focus, memory and productivity from advanced drugs and brain-training tools and techniques

are too strong an incentive to abstain. There are no "John Henry" heroes in the cognitive economy.

Many companies have begun an innovative way to pay employees for their labor. Using infrared measurement tools that track cognitive load and mental labor, companies can get a much more precise accounting of what an employee is actually contributing to the business (Hirshfeld, Solovey, et al. 2009). The scientification of factory work was relatively easy to accomplish, but one of the most difficult things in the slippery world of intellectual and creative work is to account for productivity in a precise and consistent way. While there are rumors that some employees are learning to "game" the system by training their brains to mimic a working cognitive load, brain measurement has become a useful tool in human resource management.

This enhancement boom has been met by protests from across the political spectrum, and has fractured many of the traditional political categories of conservative, progressive, and libertarian. Many religious leaders see augmentation as robbing humanity of necessary constraints—in essence cheating God and nature. Many on the left see this as a chemical conspiracy by the pharmaceutical industry and the titans of capitalism to squeeze more intellectual value and productivity out of an already over-burdened workforce. Other observers see this "neuro bubble" as just the latest economic trick to delay the inevitable collapse of a global system built on a monetary house of cards. But economic and political power remains in familiar hands, and global challenges, from social inequality to climate disruption, remain an ever-lurking shadow over this massive growth.

But no one can deny the exhilaration of possibility at both an individual and population level, as the creative powers of connected and amplified human mind unleash innovations from the whirling centrifugal force of cognitive capitalism.

Infinite Cortex: Governing the Cognisphere

When intelligence, agency, and responsibility are spread throughout a system, the notion of individual intelligence becomes nothing more than a useful fiction. And in this world of distributed consciousness and networked cognition, it is a fiction that is becoming increasingly anachronistic. Human minds are now intimately woven into a world of feedback interfaces, with the brain seen as a floating node in a server cloud. Brain functions are becoming unbundled and harnessed with a precision and power we've never seen before.

Whereas most of our structures of governance were based on a view of people as essentially selfish and corruptible, new understanding of how the mind perceives and judges the world, along with the intimate links we've created with each other and the technologies for sharing experiences have re-defined our identities around other traits, such as empathy, compassion, collaboration, and collective happiness. Governance is now focused less on individuals, and more on networks of intelligent entities.

New entities have been given "rights to think" and participate in political life. Much like corporations were treated as legal persons, new laws have allowed any group of people to "incorporate" and distribute their responsibilities and increase their collective power (Bollier 2008). Many of these groups include humans and quasi-artificial intelligences.

Governance is non-spatial. In other words, a person can live anywhere and still carry with him or her, the set of appropriate and applicable laws. Their neighbor may carry a different set of laws. Geographically relevant issues, like water usage, are mediated locally (Tonn and Feldman 1995).

A modified form of direct democracy has been implemented. An elected group of representatives still introduces law and must approve voter decisions before going to the executive branch, but every registered citizen is given the right to directly vote on laws. Many people give their "rubber stamp" vote to the position of their chosen party or affinity group.

Others rely on complex preview simulations that use aggregated personal expressions, behavioral patterns, neurological profiling, and individually chosen value parameters to create a virtual personality for the user. Proposed laws are then compared with the choice profile of the virtual representative, and a voting recommendation is made. While the neurological and behavioral information creates very accurate predictions of how users would vote, the ability to choose a set of values often complicates issues where values conflict with behavior. Nevertheless, many people use these voting avatars exclusively, sometimes rarely even reviewing the recommendations before casting their automatic vote.

While in many ways existence has been transformed for the better, it is not "human" existence as most people have known it. Some even lament the "dreary predictability" of life, where behavior and thinking can be predicted with such high accuracy. There is a sense of loss felt by some that while we are more connected, we don't have a sense of personal agency and ownership over our destiny. We are simply cogs in a large wheel.

Privacy, especially mental privacy, has not been ripped away, but is simply fading into the past. People have become comfortable freely sharing their inner life with others. This allows a kinship and intimacy between people at depths never before seen in history. While some wish for the days of bounded individuality, most people are uplifted by the sense of being part of something greater than themselves, and are happy to contribute the ever-unified whole of humanity.

Conclusion: Designing New Governance Environments

With our better understanding of how thinking occurs, and how a thinking mind both utilizes and engineers its technologies and environment as a cognitive aid, we can, as Andy Clark argues, "build designer learning environments tailored to install and support better habits of thought" (2004, 159). Nowhere are "better habits of thought" needed than in our current systems of government.

To meet the challenges of the 21st century, we need thinking that is holistic, multi-layered, multi-generational, anticipatory, and tolerant of ambiguity. Yet, we have a system of government that rewards reductionist, short term, present-oriented, protectionist, risk-averse, and absolutist thinking. A psychological and cultural mind-shift is needed, but this will not occur until we make some substantial changes to the structure of our government. Until we change how we govern ourselves to become *more* participatory and *more* anticipatory, we are looking at a future of repeating the same mistakes at grander scales, with less of a reservoir of resources for recovery.

Re-designing government is the grand challenge of the 21st century, but grand narratives, such as the Enlightenment or Marxism, fail to provide a vision and motivation for action in today's world. Powerful new sciences and technologies have been developed, however, to aid in the journey toward a better future. On the backbone of the Internet, social media and real-time communication platforms allow users, including their representatives, to "feel the pulse" of public sentiment and desire. No longer are intuitive guesswork or proxy indicators (like polling or surveys) adequate to understand what people really want. In truth, politicians may not really *want* to know what their constituents are thinking, but the information is there to develop a propinquity—a friendship born of connection—between

governors and the governed at a depth and at a scale previously reserved for only very local politics.

And related to the ability to share experience and desire with greater closeness, collaboration tools to build things together quickly and effectively are easily accessed. The barriers to "scaling up" have been greatly reduced. With the right platform, millions can come together quickly to conduct scientific research, make a political statement, or solve a problem. Galaxyzoo.org, a platform to allow users to identify and categorize galaxy types, is but one successful example. Search and rescue missions, disaster relief, and other public service functions have also been done using coordinated efforts of digitally leveraged and connected individuals. This ad hoc, collective power is just now being understood culturally and politically, and has not yet demonstrated its full force as some are forecasting (Shirky 2010, McGonigal 2011).

Finally, we are understanding who we are as thinking human beings with much greater resolution. We can see our cognitive biases and capacities with greater clarity, and can build our governance structures around those qualities. While knowledge always carries previous assumptions with it, the expansion of understanding about our behaviors, motivations, and decision-making abilities gives us a chance to re-design government as a meta-cognitive augmentation. Just as we have created courts to adjudicate matters more fairly than we could as biased individuals, we can create governance structures that mitigate our limitations and enhance our collective capacities to envision future possibilities and make better decisions about how to reach our preferred futures.

Governance in the age of neuropolitics must be mindful (and critical) of the forces that are doing the "tailoring" of our habitual thought patterns. With an extended mind that is influenced by the values and patterns embedded in our

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language, technologies, and even our built environment, *everything* has a neuropolitical agenda. Democratic, participatory, anticipatory governance structures must be built holographically, that is, they must be present within from the highest levels of constituted structures of government, down to the fabric of everyday life decisions.

What are the designer governance environments of the future? Who will build them? What knowledge and values will drive their design? Those are the key questions guiding the neurocentric politics of the present, and of the future.

Conclusion: The Possibility of Minds

I say possibilities, not probabilities. A key role of theory is to probe the positive possibilities that might otherwise be overlooked and that, indeed, may be unrecognized because they have been generated by new [[unprecedented, changing]] circumstances of being. The next thing to do is to inspire the pursuit of those possibilities that are most desirable. Paying too much attention to 'probabilities' undercuts these efforts. For, most of the time, the recognized register of probabilities consists of things that are already part of the established practice. Those who pursued Christianity, secularism, feminism, gay rights, and so forth at the key moments of their emergence from below the register of established practice were not probabilists of the sort anointed by most social scientists. They were acting to bring something new into the world even more than they were watching to see what was already there. And each time a project succeeds, in a large or small way, it provides another piece of evidence, for those who will look, against the ontology of much of contemporary social science. Possibilities are for visionaries and activists, probabilities are for spectators and consultants— William Connolly (2002, 216).*

Connolly's profound statement, humbly placed as a footnote in his *Neuropolitics*, captures the sensibility toward possibility that has been a magnetic pole throughout this exploration. My goal has been not to map the territory of neuropolitics as such, but rather to probe the possibilities that arise at various sites of contestation and key moments of encounter between the human mind and the forces that would control it. In general, I have taken a skeptical view, and critiqued the repressive aspects of neurocentric knowledge-powers at these encounters precisely because I believe in the liberatory potentials that new understandings of the brain and mind could bring to politics at every scale—from the personal to the global.

The brain sciences and neural technologies are certainly creating "new circumstances of being," in Connolly's phrase. While motivated by the goal of improving the health and well-being of people, these fields have also opened the door of the mind for old forces of control, creating opportunities for the extension of power into the brain and extended mind. The desire for control is not new, and many of the agents in this battle for control are familiar, from the formal institutions of state government to large capital interests to individuals using guerilla tactics of resistance, but neuroscience has given these old foes a new theater of operations.

As the locus of cognition shifts further outward and the mind becomes embedded in more and more of the artifacts in our environment, unusual places and unexpected agents become relevant to neuropolitics. More of the political dynamics of the world can appropriately and usefully viewed through a neuropolitics lens, and more of the dynamics of power can be seen as the emergence of neuropower.

The more neurocentric the world becomes, the greater the necessity to understand, critique, and engage in a political discourse that resonates with the brain sciences. However, while the brain has become a "hot" topic in a wide range of academic disciplines and popular media today (with the neuro-prefix edging quickly toward cliché) we are still lacking in generative theories and models to understand the profound transformations that are occurring. By combining a view of politics as a re-distribution of the sensible with theories of the mind as a phenomenon of the brain, the body, and the world, this dissertation intends to contribute to the further development of just this sort of generative approach. It intends to further the theory and application of neuropolitics, and expand the range of topics to be regarded as neuropolitical issues.

With these goals in mind, I began this journey at the dawn of neuroscience in the anatomical theater of Thomas Willis, as he and his colleagues began to

feed their fascination to "open up the head." The brain began to exert a strong gravitational pull on the scientific and political imagination. Even from the start, neuroscience was infused with political motivations. From Willis's attempt to scientifically legitimate class and social hierarchies, to the exaltation of the brain and its highest functions by Enlightenment revolutionaries, neuroscience has served, and has been steered by, political and social forces.

For most of its brief history, the brain sciences have been driven by the governmentality and biopower of discipline. This system of power relations facilitates the calibration of individual bodies within larger social structures—"disciplining" bodies through institutions such as schools, or the military, or the medical establishment. Biopower relies on a system of enclosures, marshaling new knowledge and technologies to mold individuals and populations.

The cranium remained intact during the age of biopower, as psychiatrists and psychologists preferred to access the brain and mind through psychoanalysis and enclosure within a psychiatric ward. But as these wards began to become overcrowded—as the enclosure began to burst, a new method was needed to relieve this pressure. The first popular method, lobotomy, broke the barrier of the cranial enclosure to achieve a new level of "desired" neuromodulation. And while this method was exposed as inhumane, it signaled the wider societal "crisis of enclosures."

The enclosures of the discipline society have been breaking down quickly over the last several decades, replaced by a continuous, free-form mode of control. This kind of power does not stop at the borders of the school, or office, or even at the borders of the body and mind. It is symbolized by the continuous communication streams and constant access of our networked mobile devices. Rapid advances in the brain sciences and neural technologies

have intersected with this Society of Control, creating neurocentric governmentality and the emergence of neuropower.

Neuropower Review

As introduced in Chapter 1 and discussed within the context of several political domains, there are at least seven modes of knowledge-power that will define the governmentality of control in the neurocentric age. They are:

- 1. Mental surveillance: the direct imaging of the functioning brain as well as the inference of mental processing by means of analysis of facial expressions, gestures, movement, or expressions on digital networks. Surveillance could take place under the auspices of several domains, including clinical medical practice, educational testing, or through the machinations of the military-security infrastructure.

- 2. Brain Facticity: the formerly inscrutable electro-chemical signals of the brain are being turned into useful and fungible information, creating a map of neurological functioning and re-defining normality at a molecular resolution. The on-going individual and population-wide calibrations of diversity and subjectivity will be made in light of this new data.

- 3. Neurocompetitive Environments: Access to cognitive enhancement within a highly competitive employment market will be drive the wider adoption of drugs, technologies, and techniques targeting the brain. Rising use of stimulants and "study-aids" by students and young workers points to the mainstreaming of enhancements, raising neuroethical issues about fairness, equitable access, and a possible "enhancement gap."

- 4. Predicting and preempting behavior: If the brain can be "read" effectively, then the next step in the policing of the mind is to thwart violent action before it happens. Following this argument, in a world where individuals have easy access to highly destructive weapons, the doctrine of preemption becomes necessary and enforceable at the personal level.

- 5. Similarity as Equality: the acceleration of change and global compression of distance have often led to the overwhelming of the cognitive capacities to process and respond to stimuli in the world. When the amygdala is hijacked, minor threats become emergencies and judging the right time and scale of intervention becomes very difficult.

- 6. Ownership of the Extended Mind: Intellectual property regimes are a major force for governing how people use culture, language, memory, and the public domain to create and share content. As these regimes evolve they will condition the possibility space and degrees of freedom of the extended mind.

- 7. Metaphors of Mind: How people think about the mind plays a key role in how they design the institutions and structures that sustain them. Whether it is the 'mind as computer' or 'mind as ecology,' attention to these models is essential to constructing social and political architectures of freedom.

These seven neuropowers are woven through each of the chapters, some more amplified in certain contexts, and others quietly embodied in every twist and turn of the dissertation.

The theoretical approach to neuropolitics that I employ builds on William Connolly's brain-based post-Kantianism and cognitive pluralism from *Neuropolitics* (2002), as well as Rancière's notion of a re-distribution of the sensible. These political theories are put into conversation with the notion of cognitive parallelism—that the mind is a product of brain, body, and world. This theoretical synthesis provides a vehicle with which to address issues related to the political importance and stakes of the expansion of the locus of cognition and the emergence of neuropower.

In Chapter 2, I explored how many of the fundamental terms of political discourse and self-artistry are being transformed by new technologies to image the brain and modulate sensory experience. Identity based on "objective" neural imagery is changing how people view and respond to notions of diversity and normality. Programmable sensory prosthetics, as embodied in the story of Michael Chorost, point to new kinds of political subjectivities that threaten to disrupt the hierarchies of political legitimacy that are based on the ability to abstract the body and the primacy of bounded, rational autonomy. And basic notions of personhood and rights are challenged by the fragmentation of consciousness and modes of collective thought and agency.

From there, I moved on to Chapter 3 and the analysis of several direct deployments of neuropower, in the form of surveillance, security, and the policing of the mind. Speed is a driver for many shifts in governmentality, as the veracity and scale of threats cannot be discerned in the time-frame required for action. With ambiguity leading to response failures, pressures to act *before* a crime is committed are growing. Reading the thoughts of individuals, or discerning a pattern of potential violence, is becoming a technical possibility. Given these tools, and the stakes involved, resisting the urge to predict and preempt crime becomes harder and harder for those in power. This test of democratic will-power has far-reaching consequences for

the thresholds and measures of criminal behavior, including fundamental principles of law and human rights, such as the assumption of innocence, due process, self-incrimination, and privacy.

Chapter 4 covered a rarely recognized, but profoundly important, domain of neuropolitics—intellectual property law. When framed in terms of the forces that own or control the scaffolding of the extended mind, IP becomes a major player in the fight for cognitive liberty and creative freedom. Arbitrary limitations on access to content, barriers to sharing information, threats of legal action, and technological lock-down of devices have been the outcome of a mentality toward complete control of creative content. The dominance of a "permission culture," within a neurocentric world means an extension of control into places heretofore unseen in human history. It points toward the possibility of mental governance by remote control.

The systems of governance humans have designed for themselves are the most powerful forms of cognitive extensions ever devised, although few conceive of governance in these terms. Governance in general, and government in particular, are forms of meta-cognitive guidance. These processes and institutions allow human minds to procure, allocate, and amplify cognitive capacities well beyond the individual. Yet, as I argue in Chapter 5, these systems were built for a human mind that doesn't really exist. As scholars such as Drew Westen have observed:

> the vision of mind that has captured the imagination of
> philosophers, cognitive scientists, political scientists since the
> 18th Century—a dispassionate mind that makes decisions by
> weighing the evidence and reasoning to the most valid
> conclusions—bears no relation to how the mind and brain
> actually work (2007, ix).

What would a new political design, based on the latest understanding of the brain, with access to the latest neural and social technologies, and reflecting how people actually behave, look like? Starting from the shared present, but branching out along different possible paths, I present four alternative futures for neurocentric governance. These include 1. A highly secure state where spiraling violence is finally controlled by mental surveillance and predictive policing. 2. A world where the cognitive surplus of humanity is put to use solving the grand challenges of climate and energy by harnessing the engagement of games and other collective activities. 3. A market-driven acceleration of cognitive capitalism where enhancement and augmentation are put into overdrive. And 4. A political system built around human empathy with such profound interdependence of minds and artifacts that individuality as we've known it does not exist.

These futures make clear the importance of neuroscience as a vehicle for the production of new political designs and formations. None of these futures is pre-determined, but all are possible. The way forward for political designers must include a deep understanding, and a deep skepticism, of the science of the mind and how this knowledge is being put to use.

Future Research

In the exploration of neuropolitics and neuropower, this dissertation covers a wide range of knowledge domains. There are many other very important domains that remain to be studied. The entire project of education involves making certain neurons fire together in certain ways, and neuroscience is starting to play a larger role in pedagogical thinking and design. If ever there was a disciplinary enclosure ripe for complete re-design from beginning to

end, it is both the lived school experience as well as the entire educational system.

I discuss clinical medicine throughout the dissertation but there are many changes happening so fast in our understanding of the brain and mind's role in health and well-being, that whole new disciplines are needed to analyze and process the changes that are occurring. From imaging and diagnostics to treatment and personalized medicine, health is becoming increasingly neurocentric.

New economic systems and organizational structures are also being rethought in light of how our brains process information, how creative productivity is measured, and even how workplaces are arranged. Neuroleadership, neuroeconomics, and brain-based organizational management will be the new lexicon for business leaders. A critical and careful approach to the application of insights from neuroscience are necessary to avoid this arena being turned into nothing more than *neurocharlatanism*.

And each one of these chapters is both an introduction and an invitation to look further at issues of diversity, subjectivity, security, speed, intellectual property and governance design. There is much more to be said about each of those topics, and I have framed them in a way that is conducive to further exploration. There are plenty of people ready and willing to continue this exploration (or exploitation). Type "neuro" + "any word you can think of" into an Internet search engine and you are likely to find a domain re-thinking itself based on insights from the brain sciences.[69]

The fascination and exploitation of neuroscience is but a symptom of a larger source of change. The true sense of critical urgency bubbling out from the neurocentric world should not be about the rush to capitalize on the hype

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that surrounds the brain today, rather, in my opinion, it should begin with the forces of control that are re-orienting vast domains of knowledge and technical prowess around the mind. Once the forces of control tighten the grip around the mind, there is no outside from which to launch a resistance movement. Watching this governmentality of control accelerate during the writing of this dissertation, such as with mental surveillance as well as with the mainstreaming of cognitive pharmaceuticals, has been a thrilling and disturbing experience. I hope this work contributes to a fuller and more robust conversation about the political impacts of neuroscience and points out critical zones for attention and intervention. Neuroscience is unleashing waves of disruptions to the theory and practice of politics. If we are to surf this wave of knowledge to friendlier shores, we've got to start paddling hard, now.

Notes

[1] Those who view human-animal chimera as a recent abomination should peruse Galen's anatomical drawings, which include over 200 instances of animal anatomy attributed to humans. In fact, Galen never dissected a human. Yet, his view of anatomy and medicine was canonical for over 1400 years (Zimmer 2004a).

[2] The Invisible College was a group of scientists, doctors, and natural philosophers in 17th Century England—many of whom went on to form the Royal Society.

[3] "The internal anatomy [was] simple. The greater part of the structure was the brain, sending enormous nerves to the eyes, ear, and tactile tentacles. Entrails they had none. They did not eat much less digest...They were heads—merely heads." – H.G. Wells.

The xenophobic paranoia in Wells' *The War of the Worlds* (1898) reflects deep human fears about subjugation at the hands of superior intelligences—fears that are today often associated with AI, neuroenhancement, and posthuman augmentation. The narrator of Wells' hostile takeover tale (a philosopher by trade) describes the Martian invaders as predominantly cephaloid brain vessels with highly attuned sensory functions (except olfaction) and several prehensile tentacles. Their bodies are almost vestigial, and they move sluggishly on Earth except when aided by their highly sophisticated three-legged war machines. While humans must constantly attend to their bodies—for food, sleep, rest, or sex—the Martians know no hunger, never need to sleep, do not fatigue, and reproduce by asexual cloning. As Wells projects evolutionary forces of his day into the human future, he sees natural and artificial selection acting on humans to favor above all else the brain, followed by the hands: "teacher and agent of the brain." *Read, click, read*.

But as the quote above suggests, *The War of the Worlds* is imbued with other cultural anxieties and philosophical concerns. Fueled by rapid advances in the brain sciences, these concerns have begun to garner more and more attention amongst scholars, neuroethicists, politicians, critics, and zealots of all persuasions. In a sense, the 'war of the worlds' being fought is not between Earthlings and Martians, or even between humans and non-humans, but instead it is a conflict of alternative future possibilities of human being-in-the-world. On the one hand there is lived embodiment more or less as we have known it throughout human existence with all its meaty pleasures and weaknesses. And on the other is an existence as abstracted brain-body, a "body-without-organs," made superior by prosthetics that enhance our ability to enact desire and thought with striking precision and ease: to simply think, and make it so.

Of course, the Martian invaders in this case are not truly disembodied, as we might see in current mind-uploading science fictions, and certainly not immune to death itself. Wells, although ultimately redeeming an embodied human existence with all its need and pain, evinces a resigned affinity for the Martian brain-bodies and suggests, "to them, and not to us, perhaps, is the future ordained." This bio-cultural war of worlds (or war of worlding) among competing models of human *being* has enormous impact on the way our collective imaginaries and sensibilities are shaped.

4 We have experienced the loss of historical, philosophical, and narrative closures as well. The ability to name, to signify, and make meaning is an enormous power. In a sense, meaning, values, boundaries, the present, reality, consensus, synapses, perception are all "loss." They make themselves present, real, meaning-full by the reduction of other possibilities. This is a necessary process for thinking, acting, learning, and being in the world, but it seems that good theories, good meditative practices, or good drugs often make us aware of what is usually taken for granted. We become aware of the contingent choices and massive societal, political, and psychological "editing-out" we have done in creating the world. A role for scholars/theorists/futurists is to *dis-close* these partitions, to re-open the options and alternatives we have over-written with our tendency to aspire to comprehensive accounts.

5 e.g. neurolaw, neurocinema, neuroethics, neuroeconomics, neuromarketing, neuroculture.

6 The term "neuropolitics" has been used in a variety of contexts ranging from Timothy Leary's messianic proclamations of transcendent neural metamorphosis (1977) to the recent research from UCLA neuroscientists that compares brain scans of U.S. voters according to party affiliation (Schreiber 2005). For the purposes of this dissertation, I am using the term as it has been defined in William Connolly's 2002 book *Neuropolitics: Thinking, Culture, Speed.* Among the theorists who attend to the intersections of biology, culture and politics, Connolly has had the most extensive engagement with neuroscience as a way to advance cultural theory. It is an approach that opens new areas of inquiry for scholars and will continue to impact political theory.

7 Where is thought occurring, and what is impacting it? As I sit here typing these words, my thinking is a product of my conscious biological brain-body, my English literacy, my experience reading the literature on the subjects at hand, my laptop computer and Microsoft Office™ interface, my motivation and obligation to express these thoughts, and a million other significant factors that make *this* thought and not another appear on the page before you.

8 I used the term "neurotechnbiopower" in Dunagan (2004), but have shortened it to "neuropower" here. Canadian citizenship scholar Engin Isin's (2004) article uses the term neuropower in a related sense, also following a genealogy from Foucault's biopower.

9 fMRI in the courts are a very contentious and unsettled issue. For a historical view, see (Khoshbin and Khoshbin, 2007), and for current issues see (Madrigal 2010).

10 "Taking no chances, the pilot decided to make an unscheduled landing in Philadelphia and reported a man with a device with 'wires' on the plane, Sullivan said. The wires turned out to be the leather straps, officials said."

11 http://www.edge.org/3rd_culture/serpentine07/images/Brand1000.jpg

12 Color enhanced, side-by-side imaging is a common aesthetic techniques in popular use of brain imaging. Before/after, typical/atypical, healthy/diseased are semiotic tropes frequently used to amplify the impact of images. See Dumit, *Picturing Personhood*.

13 Or, taking humor as a mirror on social truths, this post from the blog The Awl (Havrileski 2011) captures the zeitgeist today:

> Accordingly, psychologists will soon shift gears from diagnosing personality disorders to diagnosing *personal branding* disorders. After all, you might be

obsessive-compulsively checking Twitter all day for mentions of your name, but that doesn't mean you're sick, it just means that you're committed to maintaining a robust social networking presence in order to adjust to the demands of an increasingly volatile global marketplace. What was once considered pathological, personality-wise, must be viewed as wildly adaptive in today's ever-shifting digital landscape.

[14] Wikipedia, s.v. "Luddites" accessed March 1, 2011 from https://secure.wikimedia.org/wikipedia/en/wiki/Luddite

[15] http://dailyafterthought.blogspot.com/2009/09/im-too-sad-to-tell-you.html]

[16] http://discover8.com/article/Deep_Brain_Stimulation_to_Reward_Circuitry_Alleviates_Anhedonia_in_Refractory_Major_Depression_0

[17] Every human being has his or her own story, and is a complex assemblage of idiosyncratic experiences, biological propensities, and 'objective' cultural, historical, and environmental factors.

[18] Interestingly, the paperback version of the book has changed the subtitle to *My Journey Back to the Hearing World.*

[19] As Chorost points out in his presentation (2007), the NAD later changed their view on cochlear implants, accepting the surgery as an individual choice.

[20] Neal Milner. "Rights" (lecture, University of Hawaiʻi at Mānoa, Mānoa, HI September 2004).

[21] e.g. Bill McKibben, Jeremy Rifkin, Francis Fukuyama, and Leon Kass.

[22] http://www.usatoday.com/news/offbeat/2007-05-26-bobblehead-scare_N.htm

[23] http://www.cbsnews.com/stories/2007/09/21/national/main3285154.shtml

[24] http://thinkingpictures.blogspot.com/2007_05_01_archive.html

[25] http://thinkingpictures.blogspot.com/2007_05_01_archive.html

[26] In 2007, as a "guerilla" ad campaign for the upcoming release of the Aqua Teen Hunger Force (ATHF) movie, based on an adult-oriented animated series, lighted signs of one of the cartoon characters "flipping the bird" were placed around Boston and other cities in the U.S. In the Boston case, fears that these ambiguous devices were terrorist bombs, sent the city into full emergency mode, causing mass evacuations and closing of buildings and streets. As part of the settlement, Turner Broadcasting, owner of the rights to ATHF, agreed to pay the Boston Police Force and the Department of Homeland Security $1 million each. https://secure.wikimedia.org/wikipedia/en/wiki/2007_Boston_bomb_scare

[27] https://secure.wikimedia.org/wikipedia/en/wiki/WikiLeaks

[28] www.augmentedcognition.org

[29] Cookies are embedded software codes that track user behavior through their web browser. Typical information gathered included time on site, links clicked, and page views. Cookies are often installed unbeknownst to users and raise privacy and security concerns. See. http://www.ghacks.net/2010/07/17/what-is-a-tracking-cookie/

[30] Concerns that include corporate tracking, as well as government surveillance. See, http://www.guardian.co.uk/media/2005/dec/30/newmedia.usnews.

[31] https://secure.wikimedia.org/wikipedia/en/wiki/Person_from_Porlock

[32] For example, I've toggled from this writing screen to other applications on my computer six separate times since starting this paragraph.

[33] This section is about the governmentality that seeks to use mental surveillance and other techniques to predict and preempt certain behaviors. It is not about the

ability for the human brain and mind to predict or forecast certain events of relevance to individuals. This aspect will be discussed in a later chapter, including reference to a growing body of literature on the subject.

[34] "Discipline" and "control" societies were discussed in Chapter 1.

[35] Before 9/11/01, but accelerated post 9/11/01.

[36] See, for example, Richard Dawkins commentary at http://newhumanist.org.uk/469/time-to-stand-up

[37] The plot of *Minority Report* concerns the politics, ethics, and corruption of individuals involved in the institutionalization of an experimental policing program. This program uses a team of precognitive psychics to identify and capture criminals before they have actually committed their crime.

[38] For a good summary of IP issues for the practice of neuroscience, see Ergenzinger et al., 2004.

[39] See Facebook's terms of service: https://www.facebook.com/terms.php.

[40] http://www.copyright.gov/title17/92chap5.html. Section 504, c. 2.

[41] See examples at www.chillingeffects.org

[42] http://www.youtube.com/t/dmca_policy

[43] Thanks to Stuart Candy for bringing this quote to my attention, and for discussions about its meanings. See Candy 2010.

[44] The "test" refers to the "acid test" Kesey and friends held periodically to introduce LSD to new and often unsuspecting people.

[45] See, for example, the Copyfight movement http://www.corante.com/copyfight/.

[46]

https://secure.wikimedia.org/wikipedia/en/wiki/Copyright_Term_Extension_Act

[47] http://www.copyright.gov/circs/circ1a.html

[48] http://www.copyright.gov/circs/circ1a.html

[49] For more on the history and expansion of copyright law, see: http://www.citmedialaw.org/legal-guide/copyrightable-subject-matter; and Mark Rose 1993.

[50] This chapter was written during the Egyptian overthrow of Hosni Mubarak and the so-called "Arab Spring," events many analysts credit to the social networking-based organization and solidarity.

[51] The Copernican revolution took us from the center of the Universe, Darwin's revolution made us unexceptional in the story of life, but when our mind itself is de-centered, then there is no place outside for an "us" to stand. It is a complete destabilization.

[52] A challenge pointed out by Andy Clark, interview with the author, June 2010.

[53] For a counter view, see Tim Wu (2008) on the reason for radical individualist models of IP distribution.

[54] "The text of Wikipedia is copyrighted (automatically, under the Berne Convention) by Wikipedia editors and contributors and is formally licensed to the public under one or several liberal licenses." See: https://secure.wikimedia.org/wikipedia/en/wiki/Wikipedia:Copyrights

[55] https://www.evernote.com/about/tos/

[56] from ACM's Frequently Asked Questions about the Student Copyright Agreement 1/8/06: **Q: Why am I being asked to sign this Agreement?**

A: The short answer is that it is University policy that things created by students—and usually faculty too—during their work at the University are owned by the University. There are many reasons behind this policy, but one of the more important include the fact that disputes about ownership of intellectual property are best avoided by getting matters agreed to in advance. So why does the University get the ownership, and not you? The University is providing you with a valuable opportunity to learn, grow and create during the course. Only a portion of the cost of providing courses is covered by your tuition and fees. Universities commonly use earnings from the licensing or sale of intellectual property to help cover their operating costs.

[57] One student who did resist, Stuart Candy, was not allowed to take an entry level film class because he would not sign away his copyright to his creations made for the class.

[58] Interview with Tom Brislin, May 30, 2007. 11:30a-12:30pm. Crawford Hall, University of Hawai'i at Mānoa.

[59] As related during Brislin interview. There was no word on whether the rights to use this agreement language was cleared by USC.

[60] And how can one student, or a small group of students expect to resist this policy? This is a microcosm of the larger issues of power and freedom faced by creators all over the world.

[61] See examples at www.chillingeffects.org.

[62] This Greek term was brought into the wider philosophical lexicon by Michel Foucault, who defined it as the "notes on the reading, conversations, and reflections that one hears or engages in oneself; keeping kinds of notebooks on important subjects (what the Greeks call 'hupomnemata'), which must be reread from time to time so as to reactualize their contents."
https://secure.wikimedia.org/wikipedia/en/wiki/Hypomnema.

[63] It is not surprising that the embattled dictators of Middle Eastern countries shut down access to the Internet during the uprisings.

[64]
https://secure.wikimedia.org/wikipedia/en/wiki/Sony_BMG_copy_protection_rootkit_scandal

[65] http://www.gnu.org/licenses/quick-guide-gplv3.html

[66] http://creativecommons.org/

[67] http://creativecommons.org/about/history/
http://wiki.creativecommons.org/Metrics/License_statistics

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