

Neuro-futures: The Brain, Politics, and Power

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Abstract

This paper takes the human brain as the central site in rapidly changing political, economic, and ethical landscapes. Advancing neural technologies are shaking the foundations of self and society. The architecture and functioning of our brains are becoming a matter of choice. Understanding the background and implications of this choice might help us avoid using technology to optimize ideologically narrow and economically dictated brain functions. Emerging cyborg and posthuman subjectivities are potential threats to established human orders, but are still politically ambiguous. The governance of cognitive enhancement, mind-machine interface, and neural imaging marks a shift in the boundaries of state control and suggests new modalities of power. These issues are complex, but we are all stakeholders in brain futures.

Introduction

The human brain¹ stands at the threshold of a radical transformation in both its functional architecture and its political importance. This is due largely to discoveries in neuroscience and neural technology (including genetics, nanotech, AI, and bioinformatics). Our three pound engine of consciousness and reality has become an issue of political contestation because the evolution of our brains is a matter of choice. This choice engages cultural, evolutionary, political, and ethical perspectives. Historically, philosophers, shamans, prophets, artists, Zen masters and others have opened new cognitive possibilities by manipulating mental frames, changing thought patterns, introducing provocative content, and the occasional psychedelic drug. But we now have

increasingly powerful and direct methods of seeing, understanding, and altering our cognitive architecture. With this new power come new responsibilities that require a re-examination of our basic categories and the way we order the world.

Access to "unmediated" information from a living brain, the potential to meld mind with machine, and the ability to enhance mental functioning force fundamental shifts in how we define ourselves and relate as humans. Neural implants, prosthetics, and drugs (neuroceuticals, cogniceuticals) generate new states of being and thinking. New subjectivities such as the cyborg and posthuman shake up the social, personal, political, and mythological layers of our existence. Ethical grey areas have expanded and governing institutions are being urged to make policy choices about what can or cannot be done

to the brain. If it ever was, the brain is no longer the stable "given" from which to secure political processes and democratic speech. In this "landscape of postmodern biology,"¹² the brain, as both subject and object, *is* political.

This paper maps a number of social and political issues generated by our increasing power to see and change the basic structure of human consciousness, thinking, and identity. I hope to bring neuroscience and brain issues into a more prominent place in futurists' priorities. A growing contingent of neuroethicists believe the new powers to read and enhance the brain will likely affect selves and societies sooner and more profoundly than widely debated issues such as cloning or stem cell technology.³

I bring together three particular discourse communities to address three related questions. The questions are: 1. What factors are forcing the brain and brain policy to become so politically important now and in the futures? 2. How will neuroscience, neurotechnologies, and neuroceuticals affect political subjectivities and democratic processes that have developed within the western liberal humanist model? and 3. How are methods of knowledge-power and governance systems changed in a world of advanced understanding and access to the brain? I'll first look at some of the social, scientific, and ethical discourses effecting the politicization of the brain. From there I'll move on to a discussion of how cyborg or posthuman subjectivities negotiate the liberal humanist public sphere. Next, I introduce a new formation of knowledge-power created by the intersection of neural technologies, increased state surveillance and security, and emerging neoliberal economic priorities.

The first discourse community I draw upon is the new but growing field of neuroethics – addressing the ethical problems raised by brain technologies. Neuroethics has distinguished itself from the larger field of bioethics because of the singular importance of the brain to human existence and identity, as well as the uniquely reflexive problems faced when the organ *making* the ethical judgments is also the *object* of these judgments. In May

2002, over 150 scholars met in San Francisco to "map the field" of neuroethics, and the conference marks a seminal point of a field still in its infancy.⁴ Martha Farah, a neuroscientist leading the call for neuroethics, notes that "neuroscientists themselves have been relatively scarce in public discourse on neuroethics, perhaps because many of the issues under discussion seem far-fetched."⁵ As the seemingly ridiculous draws nearer, neuroscientists are increasingly joining the small number of philosophers, social scientists, policy-makers, lawyers, and futurists in the discussion.

"Giving in" to gravity is to be constantly falling – to be weightless. This acceleration is only halted by objects – the ground, a chair, a pool of water. Knowing is "giving in" to an idea. The beautiful acceleration of knowledge is only limited by the physical constraints of our brains – the speed of our cognition, the limited "space" of neurochemical memory formation and recall. Humans have longed for the weightlessness of perfect knowing. They have extended their minds through language, writing, recorders and digital networks. These technologies have decidedly increased the speed of information transfer, the access to knowledge, and extended the memory banks of culture. But humans did not evolve for weightlessness; our muscles atrophy, our bones weaken, our flesh withers away. Cyborgs were invented as an answer to the rigors of space and weightlessness. They have come (by way of the ideology of cybernetics and information theory) as one answer to the limitations of our heavy brains. Will the human body wither away under these conditions?

I have also relied upon the critical perspectives coming from theorists in political science and cultural studies. Much of the genealogy and deconstruction of relevant technoscientific master narratives has been done by cyborg and posthuman theorists. In particular, I have been greatly influenced by the work of N. Katherine Hayles, Donna Haraway, and William Connolly.

These thinkers examine the social processes of knowledge construction as it relates to technological change. They offer compelling situated theoretical locations from which to analyze relations of power. This is especially important when looking at the brain – the organ that both inscribes and deconstructs our own narratives of reality. Much of western method since the enlightenment can be seen as the attempt to overcome the subjectivity of the embodied mind, but there is no way to get outside of culture and there is no way (yet) to get outside the brain. Thus, the brain is considered here as both a discourse and a "thing"; part of a larger network of physical and symbolic interactions. The brain epitomizes "the multiple new ways in which social and material relations are entangled together, blurring conventional distinctions between the software and hardware of our social lives."⁶ Thought-worlds, themselves culturally, politically, and physically situated, generate technologies which change the way new thought-worlds are created.

Finally, I speak from and to the field of futures studies. In this paper, I look at the processes forming brain futures by utilizing Dator's alternative futures perspective and aspects of Inayatullah's method of causal layered analysis.⁷ CLA is particularly useful because it forces us to re-think the structures and assumptions surrounding the object of its attention. The complex relationships and meanings that accompany the brain at all layers benefit from a method such as CLA to render them visible. Using this methodology, I am trying to show what brain technologies "come with," – physically, politically, and metaphorically – and the implications of those relationships.

I join those scholars looking for a space outside of deterministic techno-evangelism which trivializes the social and ideological factors affecting processes of change. By taking a layered approach, I hope to also avoid the limitation of some constructivists whose focus on "linguistic performances" elides the weight of life's architecture and bio-physical processes, feelings, and experiences.⁸ I do not incorporate biological and technological aspects of the brain to map any deterministic territories: "Anatomy

is not destiny." But, neither are our brain futures free from the limitations and possibilities conditioned by interaction between the structures and processes of nature and culture, evolution and politics. This paper hopes to contribute to a discourse that "advance[s] a political pluralism appropriate to the acceleration of speed, compression of distance, and multidimensional diversity marking contemporary life"⁹ by centering the pregnable brain in emerging technologies, political contestations, and mechanisms of power.

The Brain as Political Subject

The brain exists as an evolved organ of the body and as both producer and product of an interconnected social system. It has now been "opened up" to politics by neuroscience and has taken on new complexities in the political arena. No longer the untouchable house of reason, the brain's uncertainty causes an "interruption" in the political process.¹⁰ Theorist Jacques Ranciere has written that politics does not start until this interruption happens, until a party has been institutionally "wronged." The human brain has now been put into a position to be wronged by brain-related technologies, and has a new and central role in political debate and policy. From more conservative points of view, the brain is wronged by those who wish to enhance it through such technologies as prosthetics or neuroceuticals. To these critics it is an affront to "human dignity" and a threat to autonomy.¹¹ Others believe the brain is wronged by those who wish to *limit* what a person can or cannot do to their own brain, by any means available. They believe it is an essential right to have control over one's own brain and its functioning.¹² State and governance institutions are increasingly participating in these ethical debates.¹³ They now must draft policies to address the potentials and threats that new technologies have on the brain and society.¹⁴

This need for a well articulated brain policy signals a fundamental shift in the boundaries of control and jurisdiction for governance, driving ever deeper. In addition to the traditional manner in which we govern and mold the brain, such as language, culture or education, we must

now take increased responsibility not only for the content and codes that the brain absorbs, but the actual physical and chemical structure that processes those codes and content. This move is not necessarily a conspiracy of "mind control," but the result opens up new spaces and methods of power which can have uncertain consequences. The fear is that if brains come under the control, then power is virtually limitless. Understanding this potential power and the social-cultural-political waves it creates are essential for preserving democratic political spaces and generating non-colonized subjectivities in the coming Neurostate.

Background Noise

In this section, I want to look at some of the technological, social-economic, and ideological issues that set the conditions of possibility for brain futures. First, what can we already do to our brains, and what is on the horizon technologically? The technological and scientific advancement associated with the human brain has taken a quantum leap in the last 5-10 years. New imaging technologies such as PET scans and functional magnetic resonance imaging (fMRI) are allowing scientists to see with increasing sophistication how a live brain works. More precise methods of neurosurgery are allowing neural implants and prosthetics to become feasible. Memory enhancement targeting amino acid and protein receptors are nearing the market. Erasing undesirable memories, fictionalized in the 2004 Michel Gondry film *Eternal Sunshine of the Spotless Mind* are a real possibility.¹⁵ A team at Duke University has developed technology that allowed a monkey to successfully move a robotic arm just by thinking.¹⁶ The new developments and radical technological leaps are seemingly a daily occurrence, and there is much more on the horizon:

The future will bring new ways of enhancement, controlling, and "reading" the brain. The current ability of TMS [transcranial magnetic stimulation] to improve cognition and mood by the activation or inhibition of specific brain areas may be refined in the service of enhancement or control. In the more distant future, similar extensions of deep

brain stimulation can be envisioned, and genetic manipulations of targeted neural systems and neurosurgery could permanently modify brain function. Nanotechnology and neural prostheses might eventually create a breed of enhanced human cyborgs.¹⁷

Right now, most advances in neuroscience are directed to those with brain damage or deterioration, but treatments for disease or handicap are often quickly appropriated for more widespread use by so-called "normal" people. The lines between therapy and enhancement are often blurry and always shifting. In addition, there are some ethicists and critics who feel that the therapy/enhancement distinction is untenable because it bases functionality on inherently problematic normative assumptions.¹⁸ There is a long and disturbing history of abuses under the banner of social health and deviance control on people we now consider normal.¹⁹

The therapy/enhancement distinction may have limited philosophical value and questionable political uses, but it will nonetheless remain important in the allocation of funding and insurance claims, affecting the distribution of enhancement technologies. Funding and access is even more salient because in our increasingly competition-based societies, many neural enhancements may soon be considered a requirement. In addition to our good friend caffeine, other drugs such as methylphenidate (Ritalin) and modafinil (Provigil) are increasingly being used in offices and schools just to keep up. Although enhancement may not be "officially" required by certain institutions, there will be strong indirect incentives to augment "normal" functioning. All else being equal, an employer will no doubt favor a worker who can maintain mental vigilance, or who has a better memory. Similar scenarios will play out in schools. A strong technological imperative combined with potential advantages at work, in school, and the ethical justifications for "self-improvement" are powerful drivers for cognitive enhancement. Unless a fundamental re-evaluation of the current system and ordering of modern life takes place, litany level and/or sycophantic enhancement of known and "valued" brain functions seems like an overdetermined result.

Social ethics encouraging self-improvement are deeply embedded in western cultures. The pull of self-improvement drives much of the western economy through the diet industry, exercise rituals, pop psychology, specialized education, etc. It seems improbable that conservative ethicists or technological skeptics will be able to convince people to demarcate mental self improvement involving *techniques* such as education and abstain from *technologies* such as drugs, implants or prosthetics. In fact, physical manipulation of thinking can itself be seen as a kind of technique. Connolly asks rhetorically, "How radical is the difference between concentrating your mind and taking Prozac to clear it of repressive thoughts?"²⁰ The preponderance of prescribed mind-altering drugs given by U.S. parents to their children and the ubiquity of other mood-altering drugs suggests that in addition to the economic incentives, there is a cultural tolerance in the west to augment and control the "normal" activities of the brain. Again, this seems likely to continue and intensify as safer and more powerful technologies become available.²¹

Artificial Pace-makers

I see "brain pace-making" as a central metaphor and driver for brain futures. In our attempt to deal with rapid societal and technological change, we turn more and more of our lives over to machines.²² And the more we automate (the story goes), the more mental resources we have available to manage the increasingly complex tasks and the acceleration that automation has wrought. More hopefully, automation would allow us the chance to make novel, innovative, and grander creations.

Often, however, our inabilities to cope with the accelerating pace of life are pathologized and treated as a disease. It is no doubt that the speed of life and compression of distance has significant negative effects on our brains.²³ People feel they cannot keep up with what they are expected to do, and do not have the time or capacity to make the innumerable daily decisions required in modern life – and they are right.²⁴ Although counter-movements involving a return to simpler ways of existing

offer hope for alternative possibilities, there is enormous social pressure in the current mainstream to PickUpTheMentalPace. People, most likely in wealthy nations, will be pulled toward whatever chemical or physical means are available to increase their brain-pace.

The vagus nerve stimulator is a neural implant that is used to treat epilepsy. It is also called the brain "pace-maker." Pace-making, with its connection to neural implant technology, could be a central metaphor for coping with postmodern life, and come to define the motivations and societal pulls toward brain enhancement.

Pace-making is also important when thinking about the democratic process and hopes for deliberative democracy. Many view the speed of modern life as detrimental to democracy. And in many ways it makes sense, how can we possibly have time to deliberate about the best decisions to make as groups or nations when things move so fast. The obvious example is the desperate passage in 2001 of the USA Patriot Act without any debate or anyone reading the bill. It is not only, however, the increasing number of novel events or the pure acceleration of speed that causes stress, but also the disjunctive paces *between* differing spheres of life. Things move at differing speeds, everything is not accelerating together. Politics is on a different pace than culture which is on a different pace than biology which is on a different pace than spiritual time, etc. As theorist Sheldon Wolin notes, "Political time is out of sync with temporalities, rhythms, and pace governing economy and culture."²⁵ Culture and economies work through replacement and obsolescence, politics works through the negotiation of difference and the logic of preservation. When new brain technologies enter the picture an even more complex situation emerges. Neurotechnologies of speed, memory, and attention could exacerbate the differing cognitive "time zones," creating more difficulties in commensurable communication.

Another important theorist on speed and politics, Paul Virilio, has argued that the acceler-

ating speed of life benefits those in power, especially those in the business of war.²⁶ Without time to question the actions of power, people are powerless. But could speed also have a liberatory dimension? I agree with William Connolly that "speed is ... profoundly ambiguous."²⁷ We can see speed not only in its destructive elements, but also as a way to break from attempts to control individuals and groups. Groups can use speed-based tactics like "flash" or "smart mobs" to subvert lumbering institutions of control. Protesters in England this year were able to track the movements of George W. Bush during his visit and to warn others of police traps. In addition, increasing speed and efficiency in communication, whether linked to brain enhancement or not, might allow for democratic processes to take place in shorter time spans without significant loss of fidelity. Enhanced recall, attention, and processing might arguably increase the quality of deliberation, as well. More fancifully, might Korzybsky's rules from general semantics²⁸ be programmed into linguistic implants so we could practice non-essentializing political speech! Ultimately we cannot yet conclude that just because democracy has historically relied on leisurely debate processes that a faster pace is undemocratic.

Cyborg Subjectivity

Political systems create political subjects that fit the political system. Neural augmentations, like all disrupting technologies, are capable of producing new subjectivities. Two such subjectivities that are implicated by brain technology are the cyborg and the posthuman. One may or may not accept the premise that we are *already* cyborgs or posthuman.²⁹ In the worldview of most in the west, humans work *with* machines and information processors, they are an essential part of our lives, but they are not "us." Prosthetic limbs, artificial organs, dialysis machines, wearable computers, or recent advances in exoskeletal armor certainly begin to blur the lines between human and machine, but they do not generally illicit the intense questioning of our very *being* that mind-machine contact does. Machines entering (and becoming) our

brains affect us at very deep levels, reaching down through the social to the mythical foundation of what makes a self. The borged brain represents a very tangible challenge to the fiction of a bounded, autonomous self, joining a host of philosophical, religious, psychological, neurological, anthropological, and theoretical challenges. But some fictions, even those built on shaky epistemological foundations have a way of outflanking, assimilating, and re-inscribing subversive meanings back into the coherent master narrative.

We insert a chip into our brains so we can process more information, but we become so good at it that there is more demand to process faster, so we upgrade our chips, and again, and again, and again. This amplified feedback loop creates the cognitive version of electronic feedback. That screeching you hear is inside your head. But, what if we manage to use it, to direct it, to *play* it. Could we have a cognitive Jimi Hendrix, teaching us how to love and make art from our cyborg feedback loops?

The ubiquitous political actor in the western bourgeois mindset has been the liberal humanist subject, deemed the "phallic citizen."³⁰ This subject represents the impermeable, rigid, self-regulating, reasonable, and modest political actor who has the ability to erase the distortions his body makes in the public sphere. This ability to abstract the body is unequally shared and has been tightly guarded by the bourgeois elite throughout most western political history since the Enlightenment.³¹ Fairness, reason, and the ability to manufacture truth were predicated on erasing subjectivity. To have a recognized "body" in the public sphere is still to be vulnerable, permeable, or unstable. Gendered, colored, sexualized bodies are "marked," "visible," and until the emergence of identity politics were not fit for recognized political action. Yet even as identity politics has allowed more involvement from those who are not abstracted from their flesh, it has not deconstructed the hierarchies of respectability and political qualification.³² Identity groups are allowed into politics, but

often end up sounding very much like the people who were there to start with. And so we look to other possibilities.

Cyborg technology "intimates that body boundaries are up for grabs."¹³³ The unnatural "touching" of human and non-human generates deep fears about losing control and autonomy. Cyborgs are hybrid figures, creating uncertainty about where the technology ends and person begins. Does the technology exist within us, or do we exist in the technology? To be recognized politically is often to become a flat and stable "identity" and to lose the ability to radicalize the public space. The implosion of inside/outside, human/nonhuman striates and destabilizes this notion of exclusionary subjectification or political conformity.

Or does it? Can cyborg subjectivity make a difference? Will augmented brains truly create a discontinuity? Will they be "in the action, be finite and dirty, not transcendent and clean?"¹³⁴ Is this technology "making queers of us all?"¹³⁵ The hope for those who want a radically democratic politics is that cyborgs and posthuman subjects will remain too "different" to be re-inscribed into narrow humanism. The foundational epistemological assumptions that generated cybernetics were consistent with liberal humanist values. Technologies, however, carry potentially subversive elements, and unintended consequences. "There is not consensus on what the posthuman portends,"¹³⁶ but her place in society is already being designed. I am hopeful, but skeptical. Even cyborgs, as radical a disruption as one can imagine, must traverse the *alternaphagia*, the reconciliation of difference into known forms, of political participation. "Cyborg-as-political-subversion" is especially ambiguous and uncertain since many cyborg technologies are driven by a desire to thrive in neoliberal, capitalist society, not to challenge it.

There are proponents of augmentation and artificial intelligence who see these technologies as the key to neoliberal economic perfection. The cyborg might enter public space not as the force that disintegrates traditional borders and hierarchies of the liberal subject, but rather reinstates the disembodied, "civic man of reason."¹³⁷ Cyborgs could in fact position

themselves as *better* representatives of liberal subjectivity, maintaining the familiar hierarchy with them on top. The ability to symbolically "split" the brain between man and machine makes for the perfect transparent witness. The machine parts and perfectly recorded memories would overcome their mere organic brain's limitations. They might argue that they are able to objectify their own subjectivity, and thus "bracket" the fallible human traits that invade their reason, performing semantic shifts between no self, mixed self, and universal self. The cyborg could still claim mastery over the self, only instead of mastery over a "single" self, it is mastery over the separate modules or systems of the self, one or more of which might be cybernetic, prosthetic, electronic, or neurochemical.

Recalling the U.S. Supreme Court's allowance of the 1924 Virginia Eugenic Sterilization Act in *Buck v. Bell*, might a cyborg judge in the futures declare that 800 generations of "human" imbeciles are enough and force cognitive enhancement?

Returning to an earlier point, the brain processes which are *already* the most socially and economically valued will be further enhanced – such as memory, computational speed, executive function, pattern recognition. Enhancement could also involve the removal of negative or unwanted traits such as violence, anger, shyness, anxiety, fear, shame, or disloyalty. In an environment where speed and information rule, those capable of taking in, sorting, manipulating, and communicating information at accelerating paces will prosper. In the information society of control, access and pattern recognition are more powerful than presence and possession. Where once possession marked the ability to be present in the public sphere, it is skill in coding and decoding that garner authority and access. Cyborg subjectivity is refigured in accordance to the ontology of the code.¹³⁸ "We become the codes we punch,"¹³⁹ and cyborgs could be masters of the code.

Of course, old systems do not disappear, and systems are usually manipulated so that the old powers have the chance to reconsolidate in

the new paradigm. Suddenly, instead of being a "monster," those with access to enhancement technologies can cast those who have not incorporated machinery or drugs into their brains as the lesser subjects. These subjects are closer to nature, limited by their inferior, emotional, and slow-paced analog brains. Did it take long for those who don't use e-mail to be marginalized? Rather than violating the trope of boundary purity or "human dignity," cyborgs transcend the quaint and anachronistic "naked" brains. Borged brains will have access to a wider world and to forms of communication that others will not. 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 posthuman prophets. In Ray Kurzweil's 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.⁴⁰

"Normality" is turned inside out from what we know today, yet normality as a category is still fetishized. In this vision, it is today's "monsters" who claim political authority in the futures. Controlling the terms of political legitimacy is essential for normalizing the constructed order. It comes to those with access and power. 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!

For some right now, the cyborg signifies a "loss" of humanity, for others the inevitable successor to humanity. Still, cyborgs inspire a conversation that amplifies basic human emotions: fear, hope, anxiety, and reverence. There may be few areas more human than the debate about cyborgs and human enhancement. Cyborgs-as-social-beings have been *in-formation* long before any cyborgs will actually come (have come) into existence. As Hayles points out,

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.⁴¹

If we care about the emancipatory potentials that these technologies possess, we must understand how certain subject figurations are constructed through layered processes. These processes, when acting through the brain, have enormous potential to unleash both disruptive and totalitarian forces. As we begin to redesign our 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."⁴²

Neurotechnobiopower

Most scholars are just beginning to understand the shift in power resulting from the information economy and the convergence of the chip and the gene through bioinformatics, yet we stand on the cusp of another revolution in both the location and mechanism of control. This re-ordering is being caused by the acceleration of neuroscience and neuro-technologies, a change in governmentality resulting from the hyperbolization of security in the "war on terror," and the growing importance of intellectual property and content control in the aesthetic/dream economy.⁴³

The changing emphasis in power can be mapped by how the convergence of the chip, the gene, and now the brain negotiates the new doctrines of security in an economy driven by the production of content and meaning. I am calling this formation "neurotechnobiopower." There has been an explosion of *neurologisms* lately and I might have shortened this gangly word to just neuropower, but I do not want to erase its significant genealogy. It begins with

Foucault's notion of biopower, moves on to Donna Haraway's conception of technobiopower, and finally to what I see as the "controlled re-insertion" of the brain, filled with new capabilities, windows, and meanings, into the center of politics and power.

Biopower

Foucault traces the shifts in governmentality, beginning in 18th century industrial nations, which gave rise to the disciplinary society, "normalizing" the individual body into the social body. This disciplining was essential to the expansion of industrial capitalism and the industrial state. "Life" was inserted into governance, taking the place of a sovereign power which had concerned itself with the border of life, i.e. death, but not generally the everyday regulation of life itself. Through biopower, the human body and the "population" were re-conceived under the logic of the social machine. It was a Newtonian universe that could be known, systematized, and internalized. A new social calculus needing statistics, demographics, and records to order and discipline bodies was developed. Scientists and bureaucrats defined "normal" by statistical methodologies and new industries of public health and medicine pathologized the outliers. Institutions like the family, factory, school, and barracks began to order daily life and their surveillance architectures shaped individual bodies and social groups. Information fed the power-knowledge of the state and instrumental reason, in turn, optimized the system. This form of power dominated throughout the 20th century and has only recently begun to be replaced.

Foucault, lecturing in 1976, suggests what the next stage of biopower might look like; a power even greater than that given by the atomic bomb and one that threatens autonomy and life itself.

This excess of biopower appears when it becomes technologically and politically possible for man not only to manage life but to make it proliferate, to create living matter, to build the monster, and, ultimately, to build viruses that cannot be controlled and that are universally destructive. This

formidable extension of biopower ... will put it beyond all human sovereignty.⁴⁴

Technobiopower

Donna Haraway picks up at this point in the story, "modestly witnessing" the current excess of biopower, this mutation in our historical narrative.⁴⁵ She posits that this excessive biopower is reflexively aware of the allure and dangers of its own limits. If biopower was ever innocent, it cannot be any longer. The "joining of informatics, biologics, and economics," and the new "kinship of the chip, gene, seed, bomb, lineage, ecosystem, and database" comprise what she calls technobiopower.⁴⁶ It is the dominant grammar of power in the New World Order, Inc., subordinating biopower (industrialism) and imploding "bodies, texts, and property" in bioinformatics.⁴⁷ The power to re-design, remake, and re-code life has been auctioned off to the scientific corporate elite and backed by the regulatory powers of patent offices through increasingly broad intellectual property rights.

Technobiopower is the "material refiguration" of mythic, semiotic, and material vectors. There is a strong teleological thread within this power to create and manipulate the codes of life. It joins technoscience with the ultimate promise of redemption and salvation. If we have failed as a species, then maybe we can create our successors to embody the better angels of our nature. The laboratory is the new cathedral housing our hopes, dreams, guilt, and fear. The saviors take the form of transgenic lab animals, sacrificed to save us. Our bible is the genetic code.

"We are the codes we punch." Having a body becomes "a function of the sign because the information age is an age whose ontology is that of the code."⁴⁸ The ability to manipulate material, semiotic, and legal codes defines wealth and power in the New World Order, Inc. Access is power, but wealth has not disappeared (it takes an average of \$1.5 million to contest a patent in the U.S.⁴⁹). New beings come into existence by the re-arrangement of genetic codes and are owned by this labor through the operation of legal codes.

Static

The world is teeming with more semantic "noise" than ever, all in communication across cultures, times, and spaces:

Culture has multiple layers, with each layer marked by distinctive speeds, capacities, and levels of linguistic complexity. And the relations between the layers are mediated by noise – just a bit of static can help a single note to stand out more sharply, if the static is not too soft or too loud.⁵⁰

Noise is a relationship between pattern and randomness. The one who has the greatest capability to recognize patterns commands power; she becomes the "Digitally Empowered Magus."⁵¹ Yet information must have a carrier and a context to become productive or destructive. The semantic or code layer becomes a battle site for control, as do the physical platforms of bodies, brains, and machines. The ability to shape the protocols of communication becomes the end to which power moves. Language, codes, and meaning can retain their elusiveness and play, so long as it is conditioned by the rules that the authority has commanded on the preferred media. Thus, a second-order power is formed— one that "seeks ... to command the power of the power of reproduction or signification itself."⁵²

And now re-enter the brain. It is the Ithaca to which all signs, codes, and meanings must return. The convergence of the gene, the chip, and the augmented brain in the realms of security, the code, and aesthetic neoliberal capitalism generates neurotechnobiopower. Foucault talked about the loss of human sovereignty caused by the excess of biopower. This may ultimately be true, but it is not necessarily a loss of *all* sovereignty, but a loss of a *kind* of sovereignty. In addition to the deconstruction of human sovereignty as a situated/historically contingent concept, we can envision a *posthuman sovereignty* or a *cyborg sovereignty* which manifests not mere autonomy, but secures conditions of autonomy and power that take into account the qualities and problems of cyborg existence.

Securing the brain

The hyperbolization of security needs to wed bioinformatics with human intention. The brain is under ever-tightening direct surveillance through new microtechnologies of knowledge-power, such as functional magnetic resonance imaging (fMRI). These technologies translate the messy, analog, and mediated messages of the brain, generally communicated through language, into a digital form necessary for universal transmission and systematic interpretation.⁵³ Imaging and digitalizing brain information and then mapping it within a statistical profile to look for violent or other relevant patterns will be a foundational method of neurotechnobiopower in practice.

State institutions and corporations need to find out what information is free, whose hands (heads) it is in, and what they intend to do with it. New technologies for detecting lies and gathering information directly from people's brains could, for better or worse, make the kind of torture in Abu Ghraib and Guantanamo obsolete. The advantage of going straight to the brain also "offers the seductive promise of prediction,"⁵⁴ a seduction especially salient in the post-9/11 U.S.⁵⁵ and one which futurists have roundly critiqued.⁵⁶ Under the logic of preemption, governments could use increasingly sophisticated techniques, such as fMRIs in airports and schools to detect brain patterns indicating violence or potential danger.⁵⁷

Preemption of crime is also a feature of proposals for "intelligent" or "automatic" governance.⁵⁸ This method of governance requires technologies embedded into objects in our environment such as cars, doorways, and consumer products. These chips would be in constant communication with a network of expert systems. Laws would no longer need to be written, they would automatically download into our environment. Vast databases would keep track of everything in our lives: air pollution, money exchanges, personal information, buying patterns, etc. I doubt anyone right now would seriously suggest linking our brains to this database by directly connecting to the network through a chip implanted in our brain (cell phones already do that!), but ubiquitous MRI

surveillance systems could track a "dangerous" mind through the environment.

Dangerous minds, or possible dangers *to* the mind, are also increasing concerns for the state. The U.S led worldwide "war on (some) drugs" represents one of the most powerful justifications for erosion of civil liberties and the extension of control mechanisms by state power. This system of control now stands waiting to enter the human brain. A recent story reported that the U.K. government is considering utilizing drug "vaccines." These "vaccines" would change neurotransmitter function so that the recipient of the vaccine would not be able to get "high" from taking a drug like cocaine, and purportedly not use it or become addicted.⁵⁹ This kind of attention to brains "at-risk" would mark the first time that "neuropharmaceuticals were overtly used to enforce government policy."⁶⁰ It would also signal a shift in the boundaries of governmental control and policy, i.e. preemptive control of brain function and *incorporating* policies directly on the brain. So, whether through a direct connection via a chip or implant, or through "preemptive" techniques like drug vaccines, government policies enacted by law go from being mediated through written texts to being directly enacted in the environment and the brain. In an intelligent neurostate, ignorance of the law is *unthinkable* and impossible.

The Economy

How will neurotechnobiopower function in a political-economy concerned less with production and information, and more with icon and image? In a recent article, Dator and Seo explore the emerging dominance of image, icon, meaning, aesthetics, and "cool" as economic drivers.⁶¹ Businesses have already begun to automate and outsource their information infrastructure and are turning more attention to the image, look, feel, and aesthetic presentation of their products. For example, General Motors wishes to create evocative "mobile sculptures" which just also happen to be cars.⁶² It is "cool hunting" and the process of creating aesthetic distinction that captures the attention of executives and drives consumer desire.⁶³ Advertising

and creation of desire are nothing new, and theorists have long posited a world built on strategic steering of floating signifiers, but they have now taken their place in the center of business praxis.

We live in a time when identities are largely based on the products you buy. Being a Coke or Pepsi person means more to many people than being Catholic or Protestant. When we start buying proprietary wetware, will our brains have a brand name?

Businesses have begun to consider fMRI of customers as a way to test and track the appeal of products.⁶⁴ Once successful images are found, it is likely that the business leaders in the aesthetic economy of image, art, and content (the iconomy) will lobby for a legal structure of stronger intellectual property protection. We already live in an age when perfect creative content control seems like the only value and advocacy of the "public" good is highly marginalized, if not forgotten.⁶⁵ The Internet is becoming more and more commodified and its content controlled. On a global scale, "free culture" and free information is being squeezed by both indigenous rights advocates who wish to limit how their images and creations are used, and by content providers who wish to guarantee a return on their creations.

Right now, ideas and images are "imperfectly excludable." If you see an image or hear an idea it cannot be taken back; "we can't (yet) erase what has entered our heads."⁶⁶ Lessig's parenthetical "yet" is prescient because we are drawing near to a time when technologies that can erase particular memories are possible.⁶⁷ Of course, these technologies would first be used to erase traumatic or debilitating memories, but could soon be pushed into "cosmetic" or economic uses. The rivalrous aspects of images and intellectual property are controlled by copyright and patent protection; i.e. no one may use these creations without permission. But a deeper kind of control may be advocated in an economy in which exchange is subordinate to signification and image.

In the neurostate, this jurisdiction reaches

into the human brain. As it stands now, content cannot be perfectly controlled. But, for example, if content could only be accessed by those with the correct codes based on a proprietary physical platform, vertical control could be achieved over all the layers. The physical platform for ideas is the human brain. For example, imagine a company develops a particular technology to allow a person to learn foreign languages quickly through a special implant in the brain. In order to keep others from infringing on their technology, they could bundle their particular implant with their particular language acquisition software. In this example, the content (the language being learned) would not be controlled, but it is not hard to imagine a scenario in which particular ideas and information could only be accessed with the right code *and* perceived only by having the correct "hardware." Sony movies could only be watched with Sony's visual implant; movies could automatically fade from memory after seven days, ideas could be "fixed" for copyright by recording devices in the brain. In another materialization of metaphor that cyborg technology seems to bring about, people might go shopping for *actual* thought vehicles!

Scenarios for the Neurostate

If Enhancements Are Outlawed only Outlaws Will Have Enhancements

Bioconservatives take control and dictate a prohibitive brain policy making enhancements illegal. Therapeutic brain technologies enter the gray and black markets. Testing for *cogniceuticals* joins the testing for other illegal drugs in the workplace and in schools. Students, for example, take a *cogniceutical* drug test before they take the SATs. Cognitive libertarians become a radicalized political group consisting of very smart criminals.

Technosapiens

Human beings speciate into various forms including posthumans, cyborgs, and naturals. Consciousness is separated from its biological substrate and uploaded into digital platforms.

Direct connection ports and a common relay language allow people to "jack" their brains into machines. There is a continuum from completely "natural" to completely "artificial" intelligence.

Schizophrenia

A rapid drive for augmentation and enhancement takes place without consideration of the layers of brain complexity and the ideological basis for such a push. Brains are brought into accelerating technological feedback loops causing severe personal and social stress. The race to keep up with machines and to compete in an increasingly automated economy drives people to take their minds to the limit. Reliance on drugs and implants destabilize personalities and people find it hard to stay connected to any kind of "human" reality. There is widespread schizophrenia, mental breakdown, and suicide. Noise rules.

Cyborg Elite

Neural augmentation and *cogniceuticals* become available creating enhanced haves and unenhanced have-nots. Enhancement begins early in life and affords more opportunities in the neoliberal political-economies. Increased computational speed, attention and memory, and decreased sleep characterize the new brain. People are able to work more efficiently and for longer hours. Governments craft new affirmative action policies that include the "non-enhanced" as an underrepresented group. Cyborg technologies reinforce the political order leaving wealth, access, and power in familiar hands.

Critical Mass

Neural enhancement increases human understanding, problem solving, foresight, and wisdom. The architecture of augmentations promotes flexibility and innovation. People can model others' reality with greater effectiveness creating more empathy. Cross-cultural and inter-personal communication takes place on deeper and more meaningful levels. Spiritual techniques and enlightenment are more readily accessible to everyone through neural technolo-

gies. Brains are networked with each other in a digital web and traditional notions of the self are subsumed by interconnected consciousness. The sum of all minds of Gaia is one.

Hearts and Minds

Another devastating terrorist attack leads to not only total neural information awareness policies but legitimizes the wartime strategy of enemy mind control. Mind altering drugs and weaponized neural technologies become standard military operations. Neural imaging and processing neuroinformatics are crucial for pre-emption and prevention. Brain control chips are implanted in citizens to manage populations during periods of martial law. Memories are widely erased, replaced or altered to fit with current policy. Survival replaces autonomy.

Conclusion

Neuroreality is reality. Neuropolitics is politics. The desire for prediction, the desire for increased control, and the growth of neuroinformatics are the forces that generate neurotechnobiopower. Although I believe that neurotechnobiopower will define the practices and sites of political contestation, the futures of our brains and brain policy are still contestable, not predetermined. We will have a stake and a choice as cultures, as nations, and as a species on how we design the architecture of our brains and what kind of brain governance we find acceptable and desirable.

In the history of our planet there has never been a time when as much biomass has been taken up by humans and human brains. Six billion people, 18 billion pounds of thinking matter is looking back on itself with powerful new tools. In addition to brain control there is the promise of enhancement. If enhancement means the optimization of a narrow view of "useful" brain functions in a western liberal-capitalist model, then the futures of the brain (and society) will be severely limited and possibly destructive. If enhancement takes on a more holistic view of the brain's place in the many layers of ethics, politics, evolution, spirituality, and mythology, then it gives us the chance to use

new technologies to re-design our brains and our world with foresight and wisdom.

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Notes

1. I note that using the word "brain" can preclude a range of meanings that I wish to retain. I use the word "brain" to indicate the actual physical organ, as the seat of consciousness and thinking, as housing and narrating a self-identity, as a political site/issue, as an object of scientific study, as a product of natural selection, and as an architect of reality.
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6. Dick Pels, Kevin Hetherington and Frederic Vandenberghe, "The Status of the Object: Performances, 6. Mediation, and Techniques," *Theory, Culture & Society* (vol. 19, no. 5/6, 2002), 1.
7. Sohail Inayatullah, "Causal Layered Analysis: Poststructuralism as Method," *Futures* (vol. 30, no. 8, 1998), 815-829.
8. William E. Connolly, *Neuropolitics: Thinking, Culture, Speed*. Minneapolis and London, University of Minnesota Press, 1-5. And for a discussion of a third space "contesting both the technocratic and rights approaches" see Sohail Inayatullah, "Alternative Futures of Genetics and Disability," <http://www.metafuture.org/Articles/geneticanddisability.htm>.

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