

Edited by Warren Neidich

The Psychopathologies of Cognitive Capitalism: Part Two

ESSAYS BY

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ARCHIVE BOOKS

VOX SERIES

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This book collects together extended papers that were presented at *The Psychopathologies of Cognitive Capitalism: Part Two* at ICI Berlin in March 2013. This volume is the second in a series of book that aims attempts to broaden the definition of cognitive capitalism in terms of the scope of its material relations, especially as it relates to the conditions of mind and brain in our new world of advanced telecommunication, data mining and social relations. It is our hope to first improve awareness of its most repressive characteristics and secondly to produce an arsenal of discursive practices with which to combat it.

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Computational Architecture and the Statisticon

Introduction

The recent connection of neuro-biopolitical inquiry to post-Operaist ontologies has created new linkages towards a deeper understanding of the causes, mediations, and cures of Cognitive Capitalism and opened a new form analysis to an activist readership. I would like to continue this conversation by moving forward the process I started in *Cognitive Architecture: From Biopolitics to NooPolitics* (Hauptman and Neidich 2010) and *The Psychopathologies of Cognitive Capitalism, Part One* (De Boever and Neidich 2013) to produce a new language with which to understand the political and cultural consequences of digital architectures upon our contemporary brain and minds. I would like to suggest a new opening for critical architecture by suggesting an alternative locus for the repercussions of avant-garde architecture and architectural theory that is the neuroplastic potential of the brain which forms one of the core conditions of what I call neuropower. (Neidich 2009) An approach, I might add, that is non-reductive or cognitivist but culturally biased and ontogenic.

The theory of cognitive architecture that I would like to realize in this paper stands firmly in the camp of those theoretical approaches that are unconcerned whether or not architecture and designed space generate platforms for practice in the neoliberal world of commoditized forms and environments. Rather, instead of creating spaces and buildings that potentiate the efficiencies of neo-liberal market networks, this work rather concerns its critique and as such its destabilization. I want to provoke another space for architectural and design discourse to operate in the age of information and cognitive capitalism by understanding its power to provoke new organs of perception and new possibilities for thought. Fredric Jameson, when explaining his initial experience of the Bonaventure Hotel in downtown Los Angeles, implicitly understood this when he stated,

I am proposing the notion that we are here in the presence of something like a mutation in built space itself. My implication is that we ourselves, the human subjects who happen into this new space, have not kept pace with that evolution: there has been a mutation in the object unaccompanied as yet by any equivalent mutation in the subject. We do not yet possess the perceptual equipment to match this new hyperspace, as I will call it, in part because our perceptual habits were formed in that older kind of space I have called the space of high modernism... The newer architecture therefore-like other cultural products I have evoked in the proceeding remarks-stands as something like an imperative to grow new organs, to expand our sensorium. (Jameson 1991, 38)

Since 1991, when he wrote these prophetic words, the landscape of understanding of the neural plastic potential of the brain and its entangled relation to cultural plasticity with which it creates a unstable and fluid affiliation has changed considerably and as such our understanding of the above statement with it.

Preliminary Remarks:

Before moving on I must first elaborate on some of the essential ideas concerning architectural responses to the new conditions of cognitive capitalism. Firstly, I will tether computational architecture to the other regimes and practices of cognitive capitalism especially its emphasis upon intensive networks. I want to argue, as Greg Lynn and others have, that architecture is no longer about static material space but also concerns mobile and dynamic fields. Not only, for instance, in our new understanding of structural tectonics and form making as multiple interacting vectors. (Lynn 1999) We now have a whole host of apparatuses, like smartphones, navigation devices and composite smart buildings containing assemblages of digitally networked self-monitoring devices leading to datascares of ubiquitous computing. These devices are the new engram-exogram dispositifs of cognitive capitalism and their actions are directed away from the laboring body towards cognitive labor and the production of the knowledge laborer or Cognitariat.

The second component of this argument is an understanding of how the relations of postmodernism as urban design and architectural practices has helped to amplify consumption. Branding in our age of advanced information technology will be *and now is* available instantly and globally. (Klingman 2007, 63) From movies, to news channels, to universities, museums and even churches are using the methods of creating brands through linkages with lifestyles, contexts and consumers all with the intention of the fulfillment of desires, real and produced. (Ibid., 64) Important to us as we transition to cognitive capitalism is how this branding has linked up with the added value spurred on by recent advances in Neuroconsumerism.

Ronald Braeutigam writes on this subject, “Montague and all have used fMRI to study neuronal responses associated with preferences for soft drinks. During informed testing, as opposed to blind testing, subjects are more likely to prefer Coke over Pepsi, and this preference is reflected in increased neuronal activation in brain regions assumed to be involved in reward. The observations obtained... shed some light on the neuronal underpinnings of brand effects...” (Braeutigam 2005, 355-360) Could the artificial stimulation of these regions one day lead to artificially induced preferences? With this in mind I want to provoke *another* space for architectural and design discourse to operate in the age of information and cognitive capitalism by understanding its power to present, display and bind together fields of exographic engineered phatic stimuli to provoke new organs of perception in the brain as synchronously elaborated neural architectures that Jameson inferred. First the probability that neurons synchronize their responses both within a particular area and across areas should reflect some of the Gestalt criteria used for perceptual grouping. (Singer 1994, 158) As we will note in what follows this synchronization of responses implicates the way that the brain neural plasticity is sculpted. The biophysics of neurons render them more susceptible to synchronized, excitatory synaptic input than to random input and furthermore synchronized synaptic input is usually more efficient at driving its target cell than if the input is desynchronized. (Koch 2004, 43) Institutional regimes of sovereign power utilize gestalt perceptual relations such as closeness, similarity and contiguity and relationship branding found in marketing techniques to enlist different synchronously attended assemblages, which has implications for what will be remembered.

Finally I would like to introduce the term ‘neuropower,’ which delineates the new conditions of power in cognitive capitalism. Neuropower concerns the ways and means that capitalism intervenes upon the neuroplasticity of the brain in order to produce the perfect consumer through bottom-up processing, activating the primary cortices of the brain like the occipital or visual cortex and the auditory cortex. “The influence of bottom-up factors may be especially strong online, as consumers engage in fast web surfing and often spend very little time on any given page. Systematically manipulating low level visual features to “guide” viewers’ eyes to a webpage’s regions of interest is possible by utilizing insights from visual neuroscience.” (Plassman et al., 2012, 22) To this form of power is added another direct action upon the frontal cortex, which through top-down processing, affects choice and prognostication (this is something I have discussed in greater detail in my own essay in *The Psychopathologies of Cognitive Capitalism, Part One*). “Pioneering work by Knutson and colleagues showed that a structure within the ventral striatum (VS), the nucleus accumbens (NAcc), is involved in encoding anticipated rewards of monetary payoffs.” (Ibid, Plassman 2012, 23) In cognitive capitalism this top-down processing will subsume bottom-up processing just as tertiary service and information economies have subsumed secondary industrial economies. In my concluding remarks I will attempt to use this form of power to construct a new model of archi-power called the Statisticon. This term describes an ongoing process of subjectivation and subjection that commences with the panopticon, continues through the synopticon and has recently emerged as the Statisticon in which architecture and designed space are entangled in synchronous and diachronous datascares. I want to alert the reader to the possibility that the Statisticon in its future rendition might not just monitor and predict your consumer choices.

Neuroplasticity

There are two kinds of cultural neural modulation: the generational and trans-generational models. Both models describe a process of epigenesis in which the environment interacts with a priori genetically inscribed unfolding of the matter of the brain. In the generational model, as the name implies, this process is related to events that are occurring in the life of that subject and the changes occurring in the microarchitectures of the brain's basic units of function, its neurons mostly at the axon-dendrite junctions or synapses a process called selective stabilization as well as its dynamic functional networks. (Changeux 1985) In the trans-generational model, recurrent cultural events like the discovery and implementation of reading and writing occurring consistently over the course of many generations and which, therefore become stable conditions of, for instance, built space, as reflected today in our symbolic and mediated spaces, are reflected in changes in the organs of the brain over time.

Generational Neural Plasticity

In the generational model the human agent is confronted with highly mobile, evanescent and diverse environment for which it attempts to find consistency. In today's world of accelerated forms and images in flux that task can be daunting. Neural plasticity is that quality that allows the unfolding of the genetically prescribed neuro-ontogenic process in the here and now to be linked up with epigenesis. In the restricted sense of the brain, epigenesis refers to the way that cultural influences, which create relationships between things and objects in the environment, affect the course of development of the genetically determined unfolding of the brain. Neural plasticity delineates the ability of the components of the brain, its neurons, their axons, dendrites, synapses and neural networks referred to as its

firmware in addition to its dynamic signatures, oscillatory potentials which allow distant parts of the brain to communicate with each, to be modified by that experience. (Edelman 1989) In Edelmans model the diversity of the brain's constituents, its so called primary repertoire, are pruned as a result of its being coupled with regimes of order, either occurring naturally or designed, nested in the chaos of the world. Dynamic oscillations are most informative when they are the result of a process of the synchronization of stimuli, which cause neural entrainment in which independent systems fall into step and become linked together. Intense and naturally occurring, like those making up an ecosystem surrounding a pond and culturally designed distributions of sensibility, those things that are institutionally produced like brands and those artistically invented so called redistributions, for instance, deconstructive architecture, bind and bundle very different combinations of stimuli together in synchronous packages. These then elicit different assemblages of synchronous neural oscillatory potentials which, as we will see further along, have neuromodulatory capacities.

The point that I am trying to make in the following section is that the brain has the capacity to change in the single lifetime of an individual as well as across multiple generations. Importantly, culture has the capacity to modulate the materiality of the brain with significant consequences. Through the traces they leave upon the cultural artifice as recurrent and ordered forms of architectural, poetic, cinematic, and artistic transcription as well as the chaos they produce to obliterate already known forms, in order to rewrite them, human beings alter their environment that shapes their brains to a degree unprecedented in the natural world. "It is this ability to shape the environment that in turn shapes our brains that has allowed human adaptability and capability to develop at a much

faster rate than is possible through alteration of the genetic code itself.” (Wexler, 2006, p. 4) After the initial events of early childhood when the neural plastic potential is greatest there occurs a period of decreased mutability. Children can recover from brain injury easier than adults and also have the ability to learn other languages more easily. Neural plastic change can and does occur in the adult brain but their capacity to do so is reduced. The child’s capacity for neuromodulation is accompanied by a lack of capacity to alter the environment while the decreased capacity of the parents’ brain to change is accompanied by a greater ability to change the environment. According to Bruce Wexler much of the adults activity is devoted to making the environment conform to those newly constructed structures of their own childhood, a process he refers to as internal-external consonance. (Wexler 2006, 5) As the child’s brain was shaped by very different circumstances than their adults, their attempt to match the environment to their modified neural structures will produce a very different world image or cinema. Importantly, “When young adults act to change the environment to match their internal structures, they struggle with their parents’ generation for control of the public space and to the extent that they succeed they alter the rearing environment of their own children.” (Wexler 2006, 6) Let us look deeper into this matter as a way to understand the power of art as a cultural and neurobiological modifier. Does it work in the way proposed here? I would argue that artistic production, as a subset of generalized cultural production, elaborates states of diversity and disorder rather than a set of intergenerational consistent linked and delinked patterns. This statement is counter intuitive to normalized accounts for instance of the avant-garde which uses configurations of the myth of Oedipus as a means to understand one generations antipathy to another. The desire to kill it off and replace another more contingent set of practices. This leads to two corollaries. First the inherent variability

and difference that is the function of the brains primary repertoire samples the pluripotential cultural plasticity according to different generational logics entangled and deranged as they are by the social, political, economic, psychic and technological relations that delineate it. This leads to different kinds of epigenetically inscribed patterns of neural modulation. Secondly the linking, as it relates to positivist notions of the history of technologies, comes later in the sculpting of this cultural plasticity by the normative processes of sovereign regimes. As opposed to emancipatory delinked artistic processes art history and market forces, operating as apparatuses of institutional normalizing regimes, operate upon the entropic, and diverse conditions of artistic creativity. Conservative regimes in their attempt to control meaning and difference operate to suppress singularities and lines of flight erupting as a result of trans-generational differences in cultural elaboration. Generous forms of a enlightened and liberal forms of governance embrace the inherent dissimilarities understanding their extended neuromodulator capacities which are essential for expanded repertoires of thought.

Trans-generational Plasticity

Trans-generational changes in neurobiological architecture are nicely exemplified by the development of writing and arithmetic some 6,000 years ago, with the first use of Sumerian tablets. As every neuroscientist knows, when a patient or subject reads while his brain is being scanned inside an MRI machine specific areas of the brain will light up. For instance, there is evidence that an area called the Visual Word Form Area (VWFA) located at the junction of the occipito-temporal sulcus, in the posterior part of the brain, is highly tuned to acquired script. This is paradoxical since there has not been enough time yet elapsed for such an area to form in such a short time period. (Deheane et al. 2004)

This area is very specialized for word recognition. It does not respond to spoken words, it is best stimulated by real words rather than consonant strings and finally the VWFA computes only invariant representations of visual words. Of interest for us here is that a complementary area of the Inferior Temporal Area of the macaques cerebral cortex does similar things and is ideally suited to learn and respond to letters, graphemes and word shapes. Of course the macaques do not speak although they do communicate. This part of the brain responds to a mosaic of simple shapes that resemble our letters. It is hypothesized that this inferior temporal area in the macaques evolved into the VWFA in humans. "In that hypothesis, it is not the human cortex that has evolved for reading—there was not enough evolutionary time and pressure for such an evolution. Rather, writing systems themselves evolved under the constraint of having to remain learnable and easily recognizable by our primate visual system. I postulate that cultural acquisitions are only possible insofar as they fit within this fringe, by re-converting pre-existing cerebral dispositions for another use... It thus becomes important to consider what may be the evolutionary precursors of reading and arithmetic." (Ibid., 141-142) The implication here is that language forms such as reading itself develops with the proclivities of the brains neural anatomy in mind. Terrence Deacon however feels that there is more to this story and that in a human society *symbolic reference is a selection force* working on the neurological resources most critical in supporting it and writes, "This, then, is a case of selection pressure affecting the evolution of a biological substrate (the brain) and yet which is imposed, not by the physical environment, but ultimately from a purely semiotic realm." (Deacon 2003) Taken together there seems to be two systems at work here. First the predisposition of certain areas of the brain for reading and simultaneously tremendous selective pressure operating on the brains neuralplasticity by its own ontogeny.

But there is one more key to understanding this process that is what is referred to as Baldwinian Evolution. (Deacon, 2003) As we saw previously human brains are highly variable at the micro-anatomical level, ie the morphology and distributions of its neurons, dendrites, synapses and glia, resulting from the different genetic contributions of the mother and father but also the results of events happening during pregnancy like illness or starvation. This variability gives certain members of a population different adaptive capacities for the wide variety of changes that they might encounter in the environment during their lifetime: reading in this case being one. Some members of the population could adapt better and take advantage of what reading provided in a broader cultural context. As Peter Godfrey-Smith states: The population will then have the chance to reproduce mutations that cause organisms to exhibit the new optimal behavioral profile without the need for learning. Selection will favor these mutants, and in time the behaviors which once had to be learned will be innate.” (Charles Wolfe in this book. 252) Could architecture, art and other forms cultural production, like language to which they are linked, provide similar patterns of abstract contingencies which act upon distributions of genes within populations?

Reformatting Architecture in the age of Cognitive Capitalism

Computational architecture is not an isolated sphere of knowledge but in fact linked to a field of similarly inflected discourses in which digital processes have become essential. As such, architecture is but one expertise that has retooled itself for the contemporary demands of neoliberalism as a global system. In modern western countries the cross-disciplinary adaptation to digital machinic technicity has had other effects on other functional systems such as the ascension of information and knowledge based economies in which mass production and industrialization has been subsumed by a performative and communicative based economy, so called Semiocapitalism which, “takes the mind, language and creativity as its primary tools of production of value” (Berardi 2007). In other words, as labor becomes cognitive the machinery of the mind and brain and their attributes, like memory and attention, are the new focus of the capitalist exploitation. Voluntary and involuntary attention as it produces saliency is important for the formation of memories in the neurobiological substrate of the brain. Internalized attention, or contemplating the minds eye, is important introspection and understanding. The terms communicative capitalism and cognitive capitalism had until recently been somewhat interchangeable. As a result of the outcome of two recent conferences entitled *The Psychopathologies of Cognitive Capitalism Part One* and *Part Two* held in Los Angeles and Berlin respectively the signifying ecology of these terms has shifted. What I would like to call the late stage of cognitive capitalism or its ‘cognitive turn’ shifts its emphasis away from so called immaterial labor in which labor and performance are entangled and which therefore does not leave a physical trace. Instead there is an appreciation for the material changes that occur in the brain. These material traces and their formation and processing are the new focuses of capitalism.

I would like to argue that the transition from architecture as a form of organization to one of enacted articulation and later to one of intense datafication and importantly prognostication, reenacts an alternative history of architecture and urbanization. One that is defined rather as an ontogeny of the optimization of extended cognition in the context of ever increasing technicity for the enactment of political control. Where architecture becomes a method of first capturing data through human-building interfaces. That this data is used to track and subjugate subjectivity embedded in actor networks not only in the past: the where and when you happen to inhabit. As we will see neuropower is interested not in the subject in the here and now but rather in the future. It normalizes futures by reducing chance and the unexpected. First by sculpting the neural plasticity of the brain especially in young children, a future subject is realized. Secondly by creating algorithms that intervene directly with those structures of the brain found to be important for making future decisions. (ibid., Plassmann 2012) Finally as we see here our choices in real time are collated and correlated creating data search profiles which can be used by corporations to create for us personalized consumer environments. In the age of cognitive capitalism this forms the relationship between cognitive (A)rchitecture and cognitive (a)rchitecture.

Furthermore I would like to suggest that this transition, in fact, follows the transition occurring already in an expanded political-cultural field. I have already argued elsewhere that along with this transition has evolved new forms of *biopower*. The disciplinary society of Michel Foucault based as it was on *Betham's Panopticon* transitioned to the society of control of Gilles Deleuze in which the static, enclosed organized architectural frame was replaced by another more incessant, dynamic and modulatory condition (Neidich 2011, 219-268). As we move towards an advanced technologically inflected, infra-structurally dominated designed space two further per-

mutations in powers methodologies occurred. *Noo-politics* and *Neuropower*. Noo-politics was an outcome of moving into what is called the attention economy where value transitioned to valorization in which the number of eyeballs watching an event, the amount of chatter in gossip and social networks became an indicex of profit. Noo-politics took memory and attention as its new territory for exploitation. (Lazzarato) Neuropower piggybacked upon Noo-politics concern for memory and attention. That is to say attention's effects on long-term memory. (Dudukovic et al. 2009, 953-961) It concerns itself less with the indirect comportment of attention networks in designed and built space and more with the consequences of attention upon the configuration of neural networks and long-term memory.

Architectural adaptations trace the story of a static and enclosed surveillance mechanism of the panopticon where one, the guard, watches many, the prisoners, to a more distributed and open variation of the *Synopticon* in which many watch a few, celebrities, in the age of television from their domestic setting. Whether incarcerated in a cell or a domestic setting, both of these models require a stabile subject. I would like to suggest that in the last thirty years architecture and urbanism has had to adjust to the mobile and topologic conditions of the digital age.

First, as it manifests itself in folded and curvilinear surfaces of form finding computational strategies and later on in the new mobility of the subject in the post-Internet digitalized domain where mobile phones, iPads and now smart glasses have made the subject an active rather than a passive entity. Parametric and digital architectures have produced an updated model that takes these dynamic contingencies into consideration and which have already been remodeled to capture and produce data. These form the rudimentary conditions of the Statisticon. Neuropower is an essential component of this Statisticon.

In cognitive capitalism information and the conditions of general intelligence itself, which is now engineered for the efficient use of the machinery of the brain, is sculpting its static and dynamic architecture. In this regard one cannot help but notice the upcoming technologies of direct monitoring. EEG machines and MRI scanners tethered to brain wave devices, first used to help patients who are locked-in, are now finding their way into computer games. “The Emotiv EPOC headset is being marketed as both a gaming device and as an aid for the disabled. It has 14 EEG electrodes to monitor brain activity, a gyroscope so it knows where you noggin is in space and packs a li-ion battery for 12 hours of use. It is also wireless, and charges via USB. The headset reads brain activity related to facial movements, and uses this to infer your emotional state and intentions. This is then translated in software to control various applications, from games to photo viewers to an on-screen keyboard.” (Sorrel 2010) In the world of data mining the negative side effects of total datafication of the built environment will be investigated. We have witnessed how the parlor games and entertainment devices of the 19th century like stereo cards and zootropes have evolved into the sophisticated technologies of cinema and virtual realities. What then of these ‘brain assisted gaming devices?’

The Exogram – Engram Assemblage

The mind can be located within and outside the skin and human cognition is locationally uncommitted; a committed in other words to being uncommitted, distributed and decentralized. Important for us here and for what is to come is that material engagement takes place along a continuum extending between theories of internalization (inside the brain) and externalization (in the environment). It is that continuum as it becomes ‘asymmetric’ in contemporary cognitive

capitalism, as we move into a world of ‘exographic excess’ that is important for theories of contemporary built space. But allow me to clarify these terms further.

The exogram-engram system is a distributed networked system that does not respect the boundaries of the material world, the body or the brain. It forms the basis of a developmental approach to distributed cognition in which “from birth the rapidly growing human brain is immersed in a massively distributed cognitive network: culture” (Donald 2008). Importantly as we have moved in the past fifty years from an extensive, analogue and linearly mapped world to one that is intensive, non-linear, and self-organized the nature of engrams and exograms followed suit mutating separately and together. As we saw above through generational and trans-generational plastic changes this change is registered in the brain’s material nature.

An engram is a memory record stored in the head. There are at least five dissociable engram or memory systems: 1). Motor skills used in activities such as writing, driving or playing video games. 2). Conditional emotional responses like anxiety created by the sight of a rival or autistic ones defined by detachment. 3). Perceptual learning as it relates to learning categories of things like flowers or faces, but also parametrically curvilinear buildings. 4). Semantic memories that tend to abstract generalizations encoded as language. 5). Episodic memories that relate to the memory of personal experiences in one’s life. (Donald 2010, 71-79) Exographic systems have important properties absent in natural memory systems that have implications for human cognition. Examples include totems, masks, knotted cords, built environments, cave paintings, stone circles and burial mounds that operate as astronomical measuring devices, trading tokens, written records, works of poetry, mathematical notations, architectural drawings, libraries and archives,

scientific instruments, moving pictures and electronic media and recently smartphones and robots (ibid. 72). Basic to any understanding of engrams, exograms, brain-artefacts interfaces is the primordial 'theory of parity' according to which if part of the world, e.g. a soft-ware program, "functions as a process which were it to go on in the head, we would have no hesitation in accepting it as part of the cognitive process then that part of the world (for that time) is in fact a cognitive process" (Chalmers and Clark 1998, 7-19). In other words portions of the external world can operate as a kind of memory store, either as a remembrance of an event or a process that exhumes and constitutes it as an assemblage in time. However the idea of parity implies that the exogram and the engram are in some way mimetic in their forms, evolution, state relations, and inherent processing operations. Recently the term parity has given way to a theory of complementarity (Malafouris and Renfrow 2010). The term 'complementarity' underscores the lack of exact correspondence between an inner cognitive memory repertoire, engram, and its external cognitive relation, exogram. For instance, "the reformatable nature of exograms allows for information to be altered and then re-entered into storage in ways that an engram clearly can not afford" (ibid.). In this regard the idea of 'things in motion' or of cultural memory as they travel through different epochs and social constructs taking on different meanings and uses is interesting for us here. Furthermore, in order to comprehend the subtleties of the relationships engram and exogram, as singular entities or as classes of things, it is essential to consider their idiosyncratic diachronic, biographical and historical aspects (Sutton 2008). Their lack of superimposition, due to a distinctive individual and dyadic character, is related to their inherent developmental asynchronicity and asymmetry. One needs to consider engrams and exograms not as crystallized entities but as intensive, interactive, folded and plicated membranes. Exograms are polyvalent fields not simply equipotential and as such morphing

contextual and contingent cultural tableaux create instabilities in them that produce spiking singularities to emerge. These singularities, when they are strong enough, produce catastrophic changes that require morphogenetic restructuring of the form in its internal tectonics and external morphology. This I would argue is where the methodologies of aesthetic form production, where use value is not a priority, and the processes of purposeful tool production, linked as it is to a specific job and use, diverge. As I am describing it here, artistic and architectural production in their most utopian condition, unfettered by for instance client requirements, as knowledge production embraces the catastrophe and the variable uncertain forms it yields.

The 'becoming-cultured brain' calls for on one hand a sympathetic historical materialism of a dynamic and active brain-artefact interface (BAI), which has enabled human beings to further optimize their environments for a more efficient habitation of their world and on the other realizes that mutual engagement can lead to destabilized results as well (Malafouris 2010). The power of architecture on one hand continues positivist progression endemic to theories of the ontogeny of tool production is countered by its other potential as a creative and destabilizing force. In an architectural context BAI could be defined as a specified and engineered technological mediation be it a material structure, process, congregation of objects, socio-material apparatuses or process, that facilitates the arrangement of a dynamic relationship or tuning between neural and cultural plasticity. Importantly in cognitive capitalism BAIs are a subset of a whole host of arrangements under the heading of Cognitive Ergonomics through which design platforms optimize cognition-tool interfaces to optimize cognitive laboring (Neidich 2002). I question the politics of this univocal concept of BAIs as proposed here through an understanding of the importance of noisy forms at odds with this positivistic ontogeny BAIs and the material engagement approach they are imbedded in

must be open as the 'Becoming Cultural Brain' model is to the power of noise, chaos, and entropy. For every exogram and engram contains with it unfulfilled promises and possibilities that emerge at points of instability such in phase changes. It is these instabilities as they morph into singularities that have the potential to disrupt the conditions that create the presentation of the exogram or the engram. That in fact allows them to become the other. For a normalized exogram, at the service of governmentality, is a synchronized assemblage of parts, an ecology of epistemic agents of thought externalized which are complexified in specific relational conformations and proportionalities to each other and to the cognitive processes that are implicitly in use by regimes of subjection. This as we mentioned above is the top-down effect of Neuropower. They are like twins and their desire to maintain the web of relations that constitute their relationship creates a field of checks and balances, which stabilize their co-determinant structure. In the process of subjection the machinery of control becomes incorporated in the subjects thinking process as automatic self-regulation.

Modification of the cognitive life of the life of things

Two brief explanations should hopefully suffice in illustrating how architecture might deregulate this self-regulation by acting to delink and disassemble the crystallized condition of the collective engram-exogram assemblage. Rem Koolhaas' *Junkspace* offers a radically different idea of understanding the condition of space then the model of Malafouris. 'Junkspace' is the apotheosis of modernization with its rational program based as it is on science and universality.

Junkspace is its apotheosis, or meltdown...although its individual parts are the outcome of brilliant interventions, hyper technical, lucidly planned by human intelligence, imagination and infinite computation, their sum spells the end of Enlightenment, its resurrection as farce, a low grade purgatory... Junkspace is the product of the encounter between escalator and air-conditioning, conceived in an incubator of sheetrock... Junkspace is... a colossal security blanket that covers the earth, the sum of all decisions not taken, issues not faced, choices not made, priorities left undefined, contradictions perpetuated, compromises embraced, corruption tolerated. (Koolhaas 2010, 137)

And what are the apparatuses of Junkspace. What are its engram-exogram assemblages? Is there a positivist treatise on their design history? According to Koolhaas there is no design but only creative proliferation that will in the end produce an alternative history of things in transition. "Where once detailing suggested the coming together, possibly forever, of disparate materials, it is now a transient coupling, waiting to be undone, unscrewed, a temporary embrace that none of its constituent parts may survive" (ibid. 140).

On the one hand such junkspace is the example par excellence of culture as a generator of diverse populations of evanescent concretions of objects and forms tethered together by chance. It is about a Situationist derive through tangled and unhomely forms that through creative sensori-motor couplings produce tethered singularities and new regularities. New assemblages of forms are created through different points of view created in human junkspace interactions. As such junkspace creates epistemological tools based on another paradigm, which is anti-positivistic. Tools that unleash the potential are implicit in chaotic and anarchic space.

The second example concerns the role of generational understandings of the uses of social media in the production of paradigm shifts that defined the political crisis known as the Egyptian Arab-Spring. The new uses of social media created a technological divide between digital natives, those born after the introduction of digital technologies and Internet immigrants, those that were born before the introduction of digital technologies. Their differences allowed for a catastrophic field change with important consequences for those who only understood the urban space in the form of a static model defined by its buildings and plazas and those who understood it rather as a fluid and dynamic condition, defined as it was by mobile phones, as a place to roam and congregate. As such the points of powers radiation no longer emanated from public buildings, the Murabak Head Quarters were set ablaze, but rather from mobile hubs and their constantly re-configured net-landscape. As such these mobile hubs and the resulting exographic interconnectivities formed fields of dynamic modulation in which transient consubstantiation of interactivity created morphing complexified exographic interfaces that were sampled by one population but not the other. This difference produced a crisis in surveillance capabilities of the government that had relied on them to track subjects and therefore a disruption in their information gathering capabilities. As such the digital natives were able to creatively reconstruct the fields of meaning as dynamic manifolds in the urban and architectural designed spaces thereby gaining control of the urban situation. Importantly this disruption of the crystallized and instrumentalized distributions of sensibility and their consubstantiated engramic memory fields came under siege and a state of emergency ensued. Policing forms of normalization that had used certain systems of control and depended upon the engram-exographic system of flows historically set in place and who themselves were constituted by those systems as means to engage in a specified form of understanding were at a neurologic disadvantage.

They were neurobiologically blind for as we saw in the opening remarks by Jameson they had not grown the organs of perception necessary to understand the new hyperspace or in this case the new dynamic fields of communication; their neuroplasticity had been sculpted by a less dynamic and non-topological field of space and time relations. As such a crisis and state of exception of thought occurred and a crisis of governmentality resulted. What is the state of exception and how can this theory be of use to us here? As George Schwab states in his forward to Carl Schmitt's *Political Theology*, "In short, 'the exception'" said Schmitt, "is that which can not be subsumed." A state of suspension of government ensues, and a state of exception is produced (Schmitt 2005).

From Taylorism to Hebbinism

Key to our understanding of labor and neural modulation in cognitive capitalism is the concept of Hebbinism; an epistemological tool to understand the conditions of worker efficiency when the factory of the mind is at stake Hebbinism is replacing Taylorism in practices of cognitive laboring and production. In 1910 Charles Taylor wrote his *Principles of Scientific Management* and laid out the fundamentals through which the mass of rule of thumb methods could be replaced by scientific principles in order to improve the efficiency of the laborer's performance and thus increase profits for their respective company. His various methods, from separating the duties of management from that of the laborer to accentuate the capacities for which they were each best suited, instituting scientific time and performance studies to sufficiently study each task, like shoveling ore, which would then be communicated and taught to the laborer, planning the sequences of performance to obtain the best and most efficient results, the addition of monetary incentives for reaching production goals were tethered to the goals and aims of Fordist work environments. (Taylor 2011)

The term Hebbinism is associated with name of the renowned neuroscientist D.O. Hebb, in a general way to describe the results of those practices and theories discovered by the heterogeneous forms of research mentioned above and applied to the production of a more efficient cognitive laborer or cognitariat. In cognitive capitalism we are all mental laborers working for free. In Hebbian efficiency neurons that fire together wire together, neural network dynamics optimize through the force of repetition, contingency and synchronicity are sculpted (Deacon 1997, 202). Please note here that these are the very same strategies of marketers and consumer neuroscientists alike are using to produce desire. His, now classical, principle was suggested as a possible neurophysiological basis for operant conditioning: “when an axon of cell A is near enough to excite a cell B and repeatedly or persistently takes part in firing it, some growth process or metabolic change takes place in one or both cells such that A’s efficiency, as one of the cells firing B, is increased.” (Bienenstock et al. 1982, 34-35) This law has been used in ways so as to understand the way the world interacts with the brain in the process of epigenesis. It is tethered to the neural plastic potential of the brain as those synapses that are potentiated by synchronous and repetitive stimulation whether man made or occurring freely in nature will develop increased efficiency and will be selected for while those that are not will degenerate and undergo what is referred to as cell death or apoptosis. “As a consequence, a given afferent message will cause the long-term stabilization of a matching set of synapses from the maximally connected neuronal network, while the others will regress.”(Changeux et al. 1993, 376) Ostensibly the consequences of this interaction with the environment over time will produce a finely tuned parsimonious brain.

In Hebbinism the conditions of the perceptual and epistemological field are reconfigured in the brain's image in order to maximize the efficiency and decrease entropy in the cognitariats decision-making processes. I call this process cognitive ergonomics (Neidich, 2002). Essential to the argument at hand is that the cognitariat is produced by a process of Hebbinism linked as it is to the overall process of cognitive ergonomics in order to produce the perfect citizen consumer who not only shops but produces good and meaningful data. "The internet is a machine designed for the efficient and automated collection, transmission, and manipulation of information, and its legions of programmers are intent on finding the "best method"-the perfect algorithm-to carry out every mental movement of what we've come to describe as "knowledge work." (Carr 2008) Software agents are playing an increased role in this development and track through the use of, for instance, cookies our every decision and spew their results right back at us with consuming suggestions and individually tailored Google search pages. Assuming the worst or the best, what affect might this have for the way in which our brains are sculpted? Furthermore I would like to take this argument a step further through a quote from Andy Clark's book *Mindware*, in which search engines might in themselves directly affect the way the immature and plastic brain of the child is sculpted.

"Imagine that you begin using the web at age 4. Dedicated software agents track and adapt to your emerging interests and random explorations. They then help direct your attention to new ideas, web pages and products. Over the next 70 years you and your software agents are locked in a complex dance of coevolutionary change and learning, each influencing and being influenced by, the other. In such a case, in a very real sense, the software entities look less like part of your problem-solving environment than part of you. The intelligent system that now confronts

the wider world is biological-you-plus-the-software-agents. These external bundles of code are contributing rather like the various subpersonal cognitive functions active in your brain.” (Clark 2001, 115)

Thus Hebbinism unlike its predecessor Taylorism operates simultaneously on three fronts. First it elaborates an environment in which the very stimuli and their arrangements are organized for the most efficient use by the cognatariat of the brain’s cognitive potentials. Secondly, through the analysis of Big Data results, which mirrors the variability of the brains of its subjects, it constructs profiles used to hone in on future decisions. Thirdly it modulates the workers neural architectures no matter how young.

Neuropower and the Statisticon

Neuropower plays an important role in the Statisticon. We have already looked into its indirect effects, through the modulation of distributions of sensibility, upon the neural plasticity of the brain. To this first condition I would like to add a second method of subjectivation, resulting from research in consumer neuroscience, upon the powers of decision-making and prognostication located in the brain’s frontal lobe (Terranova 2011). Time does not allow a thorough investigation but I go into this in more detail in a forthcoming essay for my book *Resistance is Fertile*, Merve 2014. What I would like to say at the start is that the predictive algorithms such as Bayesean inferences are being used in a variety of fields such as cognitive neuroscience to understand free choice decisions in uncertain circumstances as well as in such fields as engineering, philosophy, robotics, economics and law. This desire to affect uncertainty to increase the efficiency of future decisions is related to neural powers desire to create a normalized future subject.

Essential to the expression of Neuropower over Noopolitics is what is referred to as top-down processing. As opposed to bottom-up processing in which varied stimulations inscribe themselves on what are referred to as the primary cortices of the brain, like visual and auditory cortex, where the initial processing of incoming information is begun, top-down processing refers to how this incoming data is modulated by higher brain centers like frontal lobe. In this way incoming information can be deemed as important or unimportant to the organisms future contingent activity and acted upon to be either intensified or edited out. "Indeed, there is ample evidence that the processing of stimuli is controlled by top-down influences that strongly shape the intrinsic dynamics of thalamocortical networks and constantly create predictions about forthcoming sensory events. We discuss recent experiments indicating that such predictions might be embodied in the temporal structure of both stimulus-evoked and ongoing activity, and that synchronous oscillations are particularly important in this process." (Engel et al 2001, 704) In bottom-up processing primary cortical areas are directly linked to the sensorial distributed field, which in our consumer society is designed to attract constituted desire, and are therefore the site of policing action. In Neuropower the emphasis of power shifts to top-down processing is focused upon especially the frontal cortices responsible for decision making and prognostication (Platt 2008 and 2009). In both cases through what are referred to as reentrant processes specific networks are stimulated repetitively and by highly synchronized activity. "Reentry is defined as the recurrent parallel exchange of neural signals between neuronal groups or maps taking place at many different levels of brain organization: locally within populations of neurons, within a single brain area, and across brain areas.

The importance of reentry as a mechanism of neural integration has been realized." (Tononi 1994, 129) This type of activity has the greatest sculpting effect on the neuroplastic potential of the brain and as such forms of governmentality

have added this effect of top-down processing to their armamentarium. I would like to speculate that re-entry is an intra-cerebral and inter-cerebral mechanism and when seen in the context of extended cognition does not respect the skull as a boundary of its operation. In fact in the context of dynamic process oriented engram-exogram complexes re-entry is the apparatus that binds the two together. In a dynamic and mobile informationalized world the importance of mechanisms of the dynamic neural intergration is ever ascending in importance.

From the Datascares to the Statisticon

Articulatory architectonics is a necessary prelude to the total quantification and intensive datafication of the designed space and as such is linked to a more advanced condition prognostication. Articulated environments allow one to make assumptions of which paths to follow in order to facilitate future encounters. Neuropower is concerned not with the production of subjectivity in the present but in the creation of a perfect consumer of the future. Articulation has moved from proscribed architectural determinations of set pathways to promote social encounters within space/time to that of proscribed contemplative decision making processes or epistemic trajectories in the minds eye. Computationalized spaces like those suggested by the likes of Kas Oosterhuis at the Hyperbody Group at TU Delft, also have the potential to create a pervasive electronic tracking system. Individuals moving in algorithmic environments searching in the datascares either with apparatuses like Google glasses, smartphones linked to QR coders or through physically compressing new smart materials that are digitally linked to massive data collecting programs. The idea of an architectural 'program' thus takes on a more sinister guise.

Over time these produce massive singular data profiles that understand possible future movements decisions in particular contexts better than the person themselves. “Imagine a city that is described only by data. A city that wants to be explored only as information. A city that knows no prescribed ideology, no representation, no context. Only huge, pure data. Overall, datascares can also be described as highly sophisticated 3D data-maps that resemble or allude to urban forms or landscape surfaces and spaces. They extrapolate quantifiable data, turning information into abstract spaces.” (Maas 1999) What seems to be a kind of Utopian vision for the future city in 1999 becomes a dystopic nightmare of the future. Tracked movements as mere interference patterns become differential equations that create maps of an individuals or population’s movements and trajectories in the city as statistics that can, as we remarked, be re-sold as information. “The prospect of so many new (and new kinds of) sensors cannot help beguile those groups and individuals, ever with us, whose notions of safety-or business models-hinge on near-universal surveillance. Law enforcement and public-safety organizations planet wide can be numbered among them, as well as the ecosystem of vendors, consultants, and other private concerns that depend on them for survival. Beyond these, it would already be hard to number the businesses fairly salivating over all the niches, opportunities, and potential revenue streams opened up by everywhere. The project of everywhere is nothing less than the colonization of everyday life by information technology.” (Greenfield 2006, 26)

The Statisticon is an advanced condition of data mining, some of which is already here and some yet to come, where upon data mining is no longer limited to the Internet and World Wide Web, in which it is used by Google and Facebook to track users and this information is sold to corporations, but is a generalized condition of living labor operating in the designed and built space of cities.

With the advent of smartphones with apps that track corporeal function, credit card swiping that tracks shopping profiles has been added Google glasses that monitor gaze of mobile agents and new kinds of smart buildings that create new information vistas to gaze upon but also create environments of data tracking and hunting.

What does this mean for future of digital architecture? When built space becomes a totally interactive and monitored datascape data collection possibilities will abound and idea of crowd sourcing will have new meaning. The perfect consumer is no longer someone who is the perfect shopper, whose mind now is self-regulated and constantly on the lookout for discounts and shopping events. The perfect consumer of the future will be a cognitive laborer whose contemplation and the decision making processes produce actions and thoughts that produce data as well. In the end, will designed software agents, which are connected to datascares that produce simulated realities and environments tailored to our data profiles? As such will collective assemblages of engram-exogram complexes be folded into these datascares in which brain-mind-environment becomes a single interactive condition of data production-storage-retrieval-analysis?

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The Psychopathologies of Cognitive Capitalism: Part Two is the second volume in a series which maps out the complex terrain of cognitive capitalism as an ontogeny in which its earlier phase has transitioned into a later phase that we are now beginning to experience. This volume collects together papers from a conference of the same name held at the Institute of Cultural Inquiry, Berlin, in the spring of 2013

The first part of the book delineates the recent emergence of characteristic psychopathologies of cognitive capitalism, which have resulted from the unique concatenation of social-political-psychological-economic relations that have produced distinct stresses and forms of derangement upon the factory of the brain. This leads to the second stream, referred to as “the cognitive turn” in cognitive capitalism. For example, as a result of the necessity for an efficient brain-mind to labor in the advanced and constantly accelerating conditions of the knowledge economy highly sophisticated and nuanced forms of attention have become compulsory well beyond what was considered essential in the older regimes of the modern. As such new *dispositifs* of normalization and governmentalization have arisen to, on the one hand, diffuse the attention necessary for multi-tasking, and on the other, to enhance the production of a hyper-attention. It is upon these and other similar conditions that this book concentrates. It calls for the identification of the causative factors of these psychopathologies as well as attempting to invent the counter conditions with which to thwart their emergence.

This book is the beginning of an antidiscursive discourse with which to create an emancipatory materialism produced not only in the world but in the brain as well.

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