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THE NEURO-COMPLEX: SOME COMMENTS AND CONVERGENCES

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Introduction

In this closing article for the first volume on “bioconvergence,” we shift the focus to the brain and to recent technologies and images that have gathered around the “neuro” that have opened the brain both to the scientific imagination and critical inquiry.

As this special issue amply demonstrates, bodies, to be sure, may be increasingly “technologized,” and technologies may be increasingly “bodied” or “embodied.” Both bodies and technologies, moreover, may be pervasively “mediatized” in these media/information-rich times of ours. But what exactly does this tell us about the brain *qua* organ of the body—orchestrator of our thoughts, feelings, behaviours, desires; object of scientific investigation and intervention; and endlessly elaborated cultural resource and point of reference? How useful is the concept of “bioconvergence” in thinking through these issues with the “brain in mind,” so to speak?

The thoughts that follow are perhaps best read as a brief preliminary set of comments (if not answers) to these questions, a work in progress, taking two key neurotechnologies in contemporary neuroculture for illustrative purposes in relation to bio- or neuro-convergent themes.

All of this, of course, begs prior questions as to what precisely we mean by “neuroculture” and how it relates not simply to the truths and technologies of modern day neuroscience, but the wider realms or vistas of political and public life, and popular culture. It is to these very matters, therefore, that we first turn as a backdrop to the neuro-related themes and issues that follow.

Tracing the Brain: From Neuroscience to Neuroculture

The past two decades have witnessed unprecedented developments in brain or neurosciences, with the 1990s declared the “decade of the brain” and a host of further neuro-related claims and concerns, hopes and fears, articulated during the opening decade of the twenty-first century.

A dense, dynamic, rapidly expanding field of knowledge and expertise, truths and technologies, the configuration of the neurosciences today bear striking resemblances to the complexities of the very brain processes and problems they seek to study. This, for example, includes primary divisions into basic, cognitive, social, and affective neuroscience, and numerous other branches or strands, synergies or synapses, not to mention newly emerging “hybrids,” which seek to align themselves with the neurosciences in various ways, some more legitimate than others. These range from neuroeconomics to neuroaesthetics, neuroeducation to neuropsychonalaysis and even neurotheology. Hence the “neuro-” is a complex field of contested truths, claims, and counter-claims. It is also a field imbued and invested not simply with considerable hope but appealing hype.

Elsewhere we have discussed a series of key “relational nexuses” at stake in these neuro-related trends and transformations (Williams et al. 2011). These, to briefly restate, include the following:

- i) *The Bio-Psych Nexus*, whereby biological understandings of mental life and social behaviour are coming to eclipse or replace previous psychological theories through more neurochemical and neurobiological or neuromolecular explanations, thereby effectively bypassing or downplaying mind in favour of brain (Abi-Rached & Rose 2010; Rose 2007);
- ii) *The Pharma-Psych Nexus*, whereby a huge growth of psychopharmaceutical markets have targeted the brain and its neurochemistry in recent decades. These include SSRIs for the treatment of depression and anxiety-related disorders, psychostimulants such as Ritalin and Adderall for attention deficit/hyperactivity disorder (ADHD), and other drugs, such as Modafinil, which in addition to their prescribed medical uses for the treatment of conditions such as narcolepsy, are now supposedly used or abused by some “healthy” members of society for lifestyle, social or recreational purposes in order to boost alertness, if not cognitive performance;
- iii) *The Subjectivity-Selves (or Identity) Nexus*, whereby neuro-related developments and dynamics are coming to affect, albeit in complex, contingent, contested and heterogeneous ways,¹ our identities, our

¹ We are not therefore claiming some simple or straightforward process here of scripting, sculpting or translation into neurochemical forms of subjectivity or selfhood. See, for example, Martin (2010) and Pickersgill et al. (2011) for recent studies demonstrating the empirical

selves, and hence the sorts of persons we take ourselves to be through more cerebral, neural or neurochemical based notions and processes of identification, subjectivity, selfhood, sociality and citizenship (Rose 2007);

- iv) *The Wellness-Enhancement Nexus*, whereby neurotechnologies, from drugs to a host of other brain-based or brain-related devices, harbour the potential to take us far beyond the poles of normality and abnormality, health and illness, to a new era of “augmentation,” “enhancement,” “optimization” or “upgrades” of various kinds, which promise to make us “better than well” or “better than humans,” if not “better than human”;
- v) *The Neuroculture-Neurofutures Nexus*, whereby the wider circulation and translation of neuroscientific ideas and practices are received within popular culture and everyday life.

It is not simply then, as this latter nexus suggests, a case of the social shaping and the social significance of neurosciences, but of a newly emerging and expanding neuroculture that bridges scientific expertise on the brain, popular cultures of the body, and neo-liberal politics of the self—see, for example, *History of the Human Sciences* 2010; Massen & Sutter 2007; Ortega and Vidal 2010; Pitts-Taylor 2010; Rose 2007; Vidal 2009—and which, despite the uncertainty of the knowledges that legitimate and sustain it, tells us that mental life can be understood, mapped, visualized, maintained, managed, improved, enhanced or optimized today or in the near future in these neuro-related, brain-based ways.

Neuroculture, to elaborate further, may be thought of as an agglomeration of dynamically related if not mutually reinforcing fields, technologies, and evidence, which connect with long-standing issues and debates regarding mind, body, brain, will, consciousness, intentionality, subjectivity, affect, and personhood, albeit within newly configured contexts and power relations.² It is also largely *promissory* in character, given the role played by scientific, popular, and public *expectations* in the mobilization of various utopian and dystopian futures, including futures past, present, and yet to come. Expectations, we might say, that are articulated and amplified in neurocultural ways, and that frame the construction of various neurofutures,

complexities and contingencies of these processes in wider public and academic arenas far beyond the laboratory or clinic.

² Our use of the term “neuroculture,” therefore, rather than “neurocultures” in the plural, as some prefer (cf. Ortega & Vidal 2010), in no way denies these disparate, diverse, dynamic strands of contemporary neuroculture: quite the reverse.

including the “retrospecting of prospects” and the “prospecting of retrospects” (Brown & Michael 2003). Together, these constitute mutually binding visions, obligations, and communities of promise within which various neurofutures are worked upon or idealized and perhaps one day realized (Martin et al. 2008).

We suggest that the convergence of these elements amounts to a newly emerging and rapidly expanding “*neuro-complex*,” a dense and dynamic constellation of thought and practice, tools and technologies, meanings and metaphors, ideas and ideologies, which, *although frequently contested and divergent in their implications*, nonetheless *converge* or *coalesce* around the brain and mental worlds.³

It is not simply therefore, returning to the central questions of this paper and the special issue, another prime case of “*bioconvergence*” regarding bodies, technologies, and media. Rather, we are pointing to a “*neuro-convergence*,” albeit a contested or far from settled or stable convergence, refracted and reflected through the forgoing relational nexuses of the *neuro-complex*.

With these preliminary thoughts in mind, it is to two key examples of neuro-convergence that we now turn in order to further illustrate and substantiate these claims.

Neuro-convergence? Neurotechnologies in Neuroculture

(1) Scanning the Brain: Visualization and Popularization

Perhaps one of the literally most spectacular faces or fronts of contemporary neuroscience concerns the ability to visualize the living brain through modern day scanning tools and technologies. A line may be traced in this respect from computerized tomography (CT) in the 1960s, through Positron Emission Tomography (PET) and Magnetic Resonance Imaging (MRI) in the 1980s, to the most recent arrival of functional Magnetic Resonance Imaging (fMRI) based on rates of oxygen uptake in different part of the brain. These technologies have generated not simply a proliferation of images of the brain “at work,” but an extraordinary range of applications, claims, and controversies, including attempts to “see” or “map” everything from supposed clinical abnormalities and drug responses to consumer choices, political preferences, even religious or spiritual experience, based on which parts of the brain “light

³ The neuro-complex, as this suggests, is perhaps best seen at present as not so much replacing as eclipsing the former “psychological” or “psy” complex, which writers such as Rose (1985) have long since detailed, documented, discussed, and debated.

up,” so to speak (brains do not literally “light up”), in response to different (laboratory controlled) stimuli.

Clearly, these images cannot or should not be taken at face-value despite the high degree of “neuro-realism” they convey (Racine et al. 2005). Their production and reception as seemingly objective or real “brain-facts,” as recent scholarship in science and technology studies and cognate fields admirably remind us, is a socio-technological accomplishment of no small import involving numerous interpretations, translations, and mediations. In other words, as Dumit (2004) convincingly shows, assumptions are not simply “designed into” these scans, but “read out” of them at every stage in the production process, from selecting subjects and the statistical techniques and mathematical models used to generate these “differences,” to the decision over how to colour them and which images to publish (on the limits of neuro-talk and neuro-images, see Crawford 2008).

It is not simply a question of the power to visualize the brain in these ways that matters, important as this question is, but the “persuasive power,” “seductive allure” (Fine 2010; McCabe and Castel 2008; Morton et al. 2006; Weisberg et al. 2008), and *popularization* of these images far beyond the lab, the clinic or even the scientific journal. Open a newspaper, turn on the television, leaf through a popular science book or magazine, surf the web, or browse the mind/body or self-help section of your local bookstore, for example, and there before you, sooner or later, you will doubtless come across a digitalized image or two of a supposedly “normal,” “healthy,” “anxious,” “autistic,” “anti-social,” “depressive,” “demented,” “obsessive” or “psychotic” brain at work, courtesy of these brain scanning technologies.

Of course, any such references are problematic, signifying as they do the all-too-common slide from “pictures” to “persons” through complex “cultural and visual logics” that equate or conflate “person with brain, brain with scan and scan with diagnosis”—processes, that is to say, not simply of interpretation but “*identification*” based on seemingly “*natural kinds*” through the digital powers and associated neuro-realism of visualization (Dumit 2004: 6). From here, moreover, it is but a small step from “neuro-talk” to “neuro-trash,” if not outright “neuromania,” based on all manner of hyped or speculative claims and vague or “voodoo” correlations (Vul et al. 2009) about brain-related matters today. Tallis’s recent remarks, for example, are instructive on this count. Whilst contemporary neuroscience, he notes, is one of “mankind’s greatest intellectual achievements,”

I am utterly dismayed by the claims made on behalf of neuroscience in areas outside those in which it has any kind of

explanatory power; by neuro-hype that is threatening to discredit its real achievements. Hardly a day passes without yet another breathless declaration in the popular press about the relevance of neuroscientific findings to everyday life. The articles are usually accompanied by a picture of a brain scan in pixel-busting Technicolor and are frequently connected to references to new disciplines with the prefix “neuro-”. (2009: 1-2)

Moreover, if you come across the latter, he continues:

...and it is not to do with the nervous system itself, switch on your bullshit detector. If it has society in its sights, reach for your gun. Bring on the neurosceptics. (2009: 7)

These claims may well be so. At one and the same time, they underline what is perhaps, for our purposes, the more important point, namely, the persuasive power and popular appeal of brain imaging technologies today, far beyond the laboratory or the clinic, as neuroculture intersects popular culture and everyday life.

To summarize, brain scanning therefore provides a powerful illustration not simply of the neuro-complex, but of neuro-convergence. To the extent, for example, that these tools and technologies provide powerful new images of the brain at work, images that convey a “neuro-realism” of sorts; to the extent that they involve albeit contested or controversial processes of identification; and to the extent that they are refracted and reflected within popular culture and everyday life; then clearly they map more or less neatly on to the bio-psych, subjectivity-selves, neuroculture-neurofutures relational nexuses identified above.

It is to our second key example of *brain boosting drugs*, rather than *brain scanning devices*, that must turn in order to more fully flesh out the other two pharma-psych, wellness-enhancement relational nexuses, and their salience and significance within the neuroculture-neurofutures nexus.

(2) *Boosting the Brain: Enterprise and Enhancement*

While the pursuits of human self-improvement and enhancement are not new, recent developments in biotechnology and neurotechnology have added important new dimensions and dynamics to these pursuits. At stake here are powerful new tools and technologies with the potential to reconfigure the “vital normativities” of “life itself” (Rose 2007) through drugs and devices of various

kinds—thereby, surely, contra Haraway (1990), rendering us “all the more biological” (Rose 2007: 80).

Enhancement in this respect no longer simply denotes improvements up to the norm (i.e., normalization) or back to the norm (i.e., restoration), but beyond the norm, as in performance augmentation or upgrades of various kinds. Technologies that “enhance evolution” (Harris 2007) make us “better than well” (Elliott 2003), and “optimize” our powers and potential (Rose 2007), thereby making us “better humans” if not “better than human” (Miller & Wilsdon 2006).

For example, so-called “cognitive enhancing” drugs are a current, much discussed and debated issue on the neuro-technology/neuro-enhancement frontier (e.g., see Academy of Medical Science 2008; British Medical Association 2007; Greely et al. 2008). These drugs, as previously noted, include a range of current or near future psycho-pharmaceuticals, which, in addition to the clinical or therapeutic benefits bestowed in the treatment of conditions such as ADHD and Alzheimer’s disease, have the potential to enhance cognition amongst the “healthy”—hence the “smart” drugs tag.

Elsewhere (Martin et al. 2011) we have identified a number of assumptions, common in the scientific and ethical literatures bearing on this topic, that serve to frame discussions and debates regarding the promises and prospects of cognitive enhancement drugs amongst the healthy. These, to briefly restate, are as follows:

- i) A number of supposed “cognitive enhancing” drugs are already available, such as Ritalin, Aricept, and Modafinil, and the number of products of this kind reaching the market will increase significantly over the next few years (i.e., the “*already with us*” or “*inevitability*” discourse);
- ii) There is established consumer demand for cognitive enhancing drugs, particularly amongst college students and other groups to help their performance in exams (i.e., the “*established consumer demand*” discourse);
- iii) Cognitive enhancing drugs are effective according to currently available animal and human trials (i.e., the “*effectiveness*” discourse);
- iv) Cognitive enhancing drugs are relatively safe, thereby posing few risks to those who take them (i.e., the “*low risk*” or “*safety*” discourse).

These discourses in turn are further amplified and endlessly elaborated through the interstices and intersections of neuroculture, popular culture, and neo-liberal enterprise culture in which freedom, flexibility, and more active forms of citizenship and self-governance are prized.

Controversies remain nonetheless. Take the media coverage of the wakefulness promoting drug Modafinil, for instance, in which ambivalence if not scepticism looms large. On the one hand, as Williams et al.'s (2008) study of Modafinil in the British print news media clearly shows, the *clinical* or *therapeutic* benefits of this drug in the treatment of conditions such as narcolepsy are extolled by the British press in a largely uncritical fashion, which is often accompanied by patient testimonies about the ways in which the drug has helped “transform” their lives, lifting them from the “fog” of excessive sleepiness or reducing their daytime napping to manageable proportions. On the other hand, concerns are frequently expressed about Modafinil as a drug that reflects and reinforces a 24/7 society and ravenous culture, which promises to further blur the boundaries between treatment and enhancement, including various military deployments or applications to combat sleepiness.

To summarize, at stake here is yet another powerful example of neuro-convergent trends and transformations, or themes or tendencies, at least. This time, however, neuro-convergence centres around the problems and prospects of cognitive enhancement—discourses and debates in which the psychopharma, wellness-enhancement, neuroculture-neurofutures nexuses loom large. To the extent, moreover, that many if not most of these discourses and debates regarding the problems and prospects of cognitive enhancement involve the articulation of futures yet to come, they also perfectly illustrate the dynamic role that expectations play in the mobilization of various neurofutures: a case, quite literally, of neurofutures “in-the-making.”

Concluding Comments

Let us return, in closing, to the implications of the foregoing sketch for questions of bioconvergence today, or in the near future.

The *neuro-complex*, we have suggested, constitutes a rich and fascinating example not simply of bioconvergence but of neuro-convergence. This case is not to imply the absence of controversy, contestation, and critique; far from it. It nonetheless suggests a neuro-related convergence of sorts regarding the brain and mental worlds—refracted and reflected through bio-psych and pharma-psych subjectivity-selves, wellness-enhancement, and what we have identified as the relational nexuses of neuroculture-neurofutures.

The dynamics of these processes are also perhaps worth spelling out in closing. The neuro-complex, as we have stressed, is not simply a newly *emerging* but a rapidly *expanding* enterprise, including both significant developments in neuroscience and neurotechnologies over recent decades and a burgeoning neuroculture that bridges or spans scientific expertise on the brain, popular cultures of the body, and neo-liberal politics of the enterprising, if not enhanced or optimized self.

Expectations too, of course, we have argued, are central to these developments and dynamics, including the articulation of hopes and fears regarding these neuro-frontiers both inside and outside the brain sciences. Here again, moreover, we glimpse not only the dynamics of neuroscience and neuroculture today, but the making of various neurofutures, including, in a reflexive vein, the role of the social sciences and humanities in the very co-construction of these neurofutures or neurofutures-in-the-making.

The intersections between the promises and prospects of various forms of neuro-*enhancement*, be they drugs, devices or new didactics, and prized neo-liberal values of *enterprise*, efficiency, freedom and flexibility, are also worth stressing here. In these and countless other ways indeed, new and old *ethical* and *political* dilemmas arise which extend far beyond the governance of neuroscience and neurotechnology, to the role of neuroscience, neurotechnology and neuroculture in the governance of bodies, selves, and citizenship: biopolitical or neuropolitical matters that implicate us all.

As for future research agendas around the brain, neuroculture, and bioconvergence, we hope this discussion indicates the vast scope and potential. Our paper in this respect is perhaps best read not simply as a preliminary sketch of these problems, prospects, and possibilities, but an invitation of sorts for further research along precisely these lines, fronts or frontiers in the decades to come as the neuro-complex continues to expand in expected and unexpected, yet equally rich and fascinating ways.

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