BRAIN THEORY. ESSAYS IN CRITICAL NEUROPHILOSOPHY

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Introduction

> I don't pretend to account for the Functions of the Brain. I never heard of a System or a Philosophy that could do it
> (Mandeville 1730, 137)

The present volume is the result of a feeling of dissatisfaction with current 'discourses of the brain', from the by-now classic project of neurophilosophy (as discussed and partially defined below) to more recent revisions such as neurophenomenology, embodied cognitive science, but also more theoretical projects such as critical neuroscience, and the welter of empirical 'neuro-'boosted fields that have emerged in recent years, such as neuroethics, neurolaw, and, differently, neurofeminism. Some of these discourses are, of course, featured here, as well as more historical and evaluative contributions, in the name of conceptual, empirical and methodological pluralism. The volume has no claim to offering some kind of exhaustive, synoptic overview of an entire field – for indeed, there *is no* field. That is, when neuroscientists from Roger Sperry and John Eccles to Jean-Pierre Changeux and Gerald Edelman wax philosophical, it is not as if their theoretical terms are clearly demarcated and can be transferred or treated cumulatively between their various inquiries, any more than when Patricia Churchland, Andy Clark, Evan Thompson, or Cordelia Fine address issues in cognitive architecture, embodiment, or social discourse on brains.[1] In addition, "the question of what counts as a good explanation of cognition has not been settled decisively."[2]

Brain theory as presented in various forms here, then, is a looser analytic category than philosophy of neuroscience, neurophilosophy or the more recent 'neurophenomenology', while at the same time being more philosophically committed than projects like 'critical neuroscience'. The former projects tend to take the form of foundational reflection on technical issues in neuroscience (Bickle and Hardcastle 2012), i.e., neurophilosophy seeks to use scientific developments to answer philosophical questions, such as those perennial

[1] Sperry 1952; Eccles 1970; Changeux 1985; Edelman 1992; Churchland 2002; Thompson 2007; Fine 2010.

[2] Symons and Calvo, "Systematicity: An Overview," in Calvo and Symons, eds., 2014.

favourites, consciousness or free will, whereas philosophy of neuroscience takes up more conceptually streamlined items from recent neuroscience in order to continue to do philosophy of science. Now, these approaches no longer have a monopoly on how philosophers understand the issues. Almost wholly opposed views, which stress the irreducibility of 'embodiment' and a role – indeed, a key role – for the phenomenological tradition, in understanding the complex of intentionality, action and motricity, have also enjoyed prominence in recent years, under the heading of 'enactivism' (Gallagher and Zahavi 2008, Noë 2004, and for more technical versions of the same programmatic view, Petitot, Roy and Varela eds., 1999 and Thompson 2007). Some go so far as to claim that the neuroscience of action (Jeannerod 1997, Berthoz and Petit 2008) 'confirms' what the phenomenology of embodiment, from the later Husserl to Merleau-Ponty, has insisted on (Petit 1997, 6). But this particular polarity is no longer so prominent in the field, just as, similarly, embodied and situated cognition are no longer exotic (Clark 2008, Shapiro 2010, Menary, ed., 2010 and Radman, ed., 2013). In this volume, embodied cognition crops in unexpected places – or at least, concerning topics rather refreshingly different from "le corps propre" and enactivism. It is most explicitly present in the essays by John Symons and Paco Calvo (on embodied robotics) and by Kellie Williamson and John Sutton (on embodied collaboration, thus bringing together embodiment and social cognition).

On the one hand, sympathetic critics have reproached the enactivist theory for its essentialism with regard to selfhood and the first-person perspective (Di Paolo 2009); on the other hand, researchers coming from very different intellectual traditions have sought to integrate select phenomenological insights into their own, naturalistic and reduction-friendly projects (Bickle and Ellis 2005). The present volume is much less concerned with the specific project of brokering a mutually beneficial conceptual outcome for phenomenology and science, or with the goal of somehow rescuing or legitimating the 'enactivist' project (as in Thompson 2007). As mentioned above, it is more pluralistic. That said, the word 'theory' in the title is meant seriously, in the following sense. While there are introductions to 'neurophilosophy' in the classic, Churchlandian sense (e.g. Churchland 2002), they feature none of the more 'critical' or evaluative readings proposed in this volume, whether they concern enactivism, social neuroscience or more historically informed accounts of neuroscientific debates (consider the perspective on memory that emerges from a consideration of Jean-Claude Dupont's chapter on memory traces as a historical problem in neuroscience, together with Sarah Robins' more contemporary reflections on the flaws of 'Neural Lie Detection' and 'brain fingerprinting', precisely because of their reliance on a discredited, archival model of memory; Robins' intimations of a more 'collaborative' dimension of memory also resonate with Williamson and Sutton's chapter).

Yet the present essays in brain theory are, in the majority, philosophical (most contributors belong to philosophy departments except for Sigrid Schmitz, Nicolas Bullot and Warren Neidich, who are respectively in Gender Studies, Cognitive Science or work as independent artist-theoreticians) rather than social and cultural studies of our relation to the figure of the

brain, the popularity of neural imaging, etc. (which is not to say that the philosopher does not have a lot to learn from such studies, e.g. Dumit 2004, Alač 2008). It encompasses foundational, conceptual inquiries (e.g. Stephen Gaukroger's essay on pain and phantom limb syndrome), empirically motivated projects (e.g. William Hirstein and Katrina Sifferd's contribution on the prospects for 'neurolaw' in the case of psychopathy), as well as more programmatic ones (Jacqueline Sullivan's suggestion for how neuroscience might rethink the call for a 'Decade of the Mind', Nicolas Bullot's proposed 'psycho-historical' theory of art, neither reductively neuroaesthetic nor merely historicist and relativist), and more speculative essays such as Warren Neidich's attempt to theorize what he calls 'neuropower', in between brain plasticity, aesthetic practice, and sociopolitical forms of control (like a more politicized version of what Malafouris calls metaplasticity, i.e. the interpenetration of cultural plasticity and neural plasticity: Malafouris 2010, 267; compare the discussion of cerebral development in Denis Forest's essay in this volume, dealing with 'neuroconstructivism'). At the same time, some of the essays here *are* contributions to the progress of neurophilosophy (John Bickle's look at how the 'little e eliminativism' inherent in molecular neuroscience might serve as a constraint on 'neuro-normativity'; Luc Faucher's suggestions for how to improve the social cognitive neuroscience of racial prejudice), or to critical neuroscience (Sigrid Schmitz's examination of the gendered dimension in 'neurocultures').

Despite the presence of the word 'theory' in the title, then, these are not primarily philosophical reflections on neuroscience of the more foundational, a priori sort, exemplified in Bennett and Hacker's 2003 study, which sought to judge all of the science from a purportedly higher, if not transcendental vantage point (John Symons and Paco Calvo in their chapter also discuss attempts like Bennett and Hacker's, to bracket off philosophy from experimental investigation into brain function). We should distinguish foundationalist from empirical approaches here. Foundationalist approaches tend to prefer a priori pronouncements on what the mind is like and why it cannot be identical with the brain. These can be Wittgensteinian, Husserlian, inspired by agent causation or various other sources. A good example is Norman Malcolm's confident assertion (contra the materialist David Armstrong) that "Since intending, hoping, knowing, etc. do *not* have genuine duration, and physico-chemical brain states *do* have it, then intending, knowing, etc. are *not* brain-states" (Malcolm, in Armstrong and Malcolm 1984, 86). Indeed, as Jean-Claude Dupont observes in his contribution, brain theory is not concerned with philosophical positions in which cerebral processes are categorically irrelevant to the understanding of mental life. Stephen Gaukroger notes here that the turn away from purely conceptual, a priori considerations of the nature of mental life (specifically, the experience of pain) is not actually a post-Quinean innovation: Descartes himself, often presented as the chief culprit qua 'inventor' of the modern mind-body problem, was in fact someone who primarily started from physiology, thus empirically, to work his way into such problems: it is by now widely accepted in Cartesian scholarship, not least due to the efforts of scholars such as Gaukroger and Sutton, also a contributor to this volume, that we need to replace our picture

of the 'metaphysical substance dualist' Descartes with that of a figure who was primarily a natural philosopher, and one who was explicitly concerned with embodiment, the passions, and the *union* of body and soul (see for instance Gaukroger, Schuster and Sutton eds. 2000).

Indeed, there has been something of an 'empirical turn', also manifest in a number of the contributions to this volume. It can take different forms, not all of which are complementary or in agreement with one another. One, which is very much connected to the emergence of philosophy of psychology as a discipline (and the way it no longer downplayed the significance of biological structures and constraints in the development of psychological theories), is a shift away from metaphysical concerns (physicalism, supervenience, emergence…) to more concrete matters, that can derive from robotics, the study of skilled behavior (including dance and sport, as described here by Williamson and Sutton), or cognitive archaeology.[3] Another, as mentioned briefly with respect to neurophenomenology and enactivism, is the way concepts such as embodiment are now investigated much more in concrete, indeed *embedded* contexts, whether biological (as in Bickle's usage of molecular-level neurobiology), behavioral (as in Sullivan's usage of the Morris water maze experiment) or artificial (as in the usage of robotics in Symons and Calvo's chapter). One thinks also of the way philosophers concerned with the 'systematicity' of human cognition rejected connectionist explanations (according to which the mind can be understood in terms of an interconnected network of simple mechanisms, as in neural networks; connectionists hold that cognitive and behavioral properties can be modeled and explained in terms of their emergence from the collective behavior of simple interacting and adaptive mechanisms) for their lack of relation to this systematic character, in favor of a detailed account of the properties of the neural substrates (Fodor and Pylyshyn 1988, discussed in Calvo and Symons 2014; see also Symons and Calvo 2009, xx-xi).

But the empirical turn is not a panacea. Some object to the turn away 'from ontology to the laboratory' that it leaves philosophical issues unresolved (see also Faucher's friendly critique of Bickle in his contribution). Others, represented in this volume by Sigrid Schmitz, stress that when dealing with any of the core aspects of human agency and personhood, there is a need for social and political critique, unless we uncritically accept, not even neuroscientific evidence, but often, ideological packaging and manufacturing of that 'evidence' (including in the case of 'neural lie detection' studied by Sarah Robins in her chapter). Schmitz's expression for this is "neurocultures": these "set out to explain and predict all modes of thinking and acting of the cerebral subject based on its brain biology" (Schmitz, this volume; see also Farah 2010).

[3] Compare the more abstract discussion of the 'extended mind' in Clark and Chalmers 1998 to that, focusing on tools and technology, found in Malafouris and Renfrew, eds., 2010, Malafouris 2013 (see also Iriki 2009) and Radman, ed. 2013. Back in 1999, Clark Glymour, in a critique of Jaegwon Kim's reliance on Davidson and Putnam in building what was mean to be a naturalistic approach to the mind, had warned about the danger of philosophy of mind losing itself in conceptual aporias (Glymour 1999).

This type of critique is primarily known under the name of 'critical neuroscience' (Choudhury and Slaby, eds., 2012; I note that I thought of the subtitle 'critical neurophilosophy' before becoming aware of the interesting literature in critical neuroscience). As its name indicates, the critical neuroscience program aims in part to criticize current developments, particularly in cognitive neuroscience (Choudhury, Nagel and Slaby 2009, 73). This can include the already-familiar social critique of our fascination with brain imaging (but also methodological problems inherent in fMRI analyses), the newer critique of 'brain-centric' explanations of personhood, agency, moral life et al., and also, scientifically informed challenges to exaggerated and otherwise ideological reports of neuroscientific findings in popular media (including in the neuropolitical sphere, as discussed below), but also in fields such as the 'neurohumanities'. Just as we are often confronted with bogus neuroscientific explanations (or 'aids') in political decision-making or religious belief, similarly, certain current forms of neuroaesthetic discourse will seek to augment literary scholarship by telling us that in reading literary prose, "the line 'He had leathery hands' has just stimulated your sensory cortex in a way 'he had rough hands' can never hope to" (Walter 2012). Nicolas Bullot and Warren Neidich in this volume, present a very different case for the relation between current neuroscience and aesthetic practice! (Cultural plasticity need not imply the converse, that a future neuroscience would enable us to 'explain' cultural forms.)

A different type of difficulty with the empirical turn, for the philosopher (here, particularly as regards 'neuroethics', the law, and other social and moral concerns such as retribution and punishment, the prediction of crime, and so on: what Bickle in his contribution calls the disciplines of "neuro-normativity"), concerns the rise of the 'neuro'-disciplines. The prefix 'neuro-' has become ubiquitous in numerous scientific and loosely scientific disciplines, offering as it does a surplus of concrete, supposedly experimentally substantiated 'brain explanations' for various hotly debated phenomena (from punishment and free will to gender and economic decision-making). But as Jan De Vos has observed, this trend has led to a doubly unfortunate effect: the weakening of the relation of any of these projects to actual neuroscience, and the weakening of the discipline of which they are the 'neuro' version of (De Vos 2014; see also Ortega and Vidal eds., 2011). De Vos quotes Matthew Taylor, a British Labour Party activist and government adviser under Tony Blair, who claimed that insights from neurological research offered a more solid base "than previous attempts to move beyond left and right" (Taylor, 2009). To the 1980s-type fascination with 'my brain is my self', the last decade has responded with a particularly vacuous version of a social turn, conveyed in a variety of expressions, from 'neurocapitalism' and 'neuropolitics' to the possibility of neuroenhanced individuals possessing a 'neurocompetitive advantage' (Lynch 2004, and Schmitz in this volume).

One problem would be the potentially illusory character of such promised developments. But another problem is in a sense the exact opposite, namely, if neuroenhancement is real, what about "the freedom to remain unenhanced" in a context where schools, in a country we don't need to name, are coercing parents to medicate their children for attention

dysfunction (Farah 2005, 37)? The ethical issues here are varied: if students have enhanced mental skills when stimulated by Ritalin, are they cheating? Or (in an example given in Bickle and Hardcastle 2012), treatments for dementia will most likely lead to drugs that increase mnemonic recollection or recall in normal brains as well: would using this drug cross an ethical line from acceptable medical treatments to unacceptable cognitive enhancements if given to members of the general population? Of course, Bickle would not say this is a problem with the empirical turn, on the contrary: the idea is rather that old ethical problems are given a new urgency and a new dimension with changes in neuroscience and pharmacology, which was not present in classic philosophical thought experiments and fictional scenarios. This is also the approach taken by Robins in her contribution. An even stronger embrace of, specifically, 'neurolaw' is in Hirstein and Sifferd's essay on "the significance of psychopaths for ethical and legal reasoning." If positron emission tomography (PET) studies have already shown that some convicted murderers have significantly attenuated functioning in their prefrontal cortex (a region known to be involved in cognitive control and planning), it is an open book for jurists to plead attenuated responsibility in terms of prior cerebral dispositions. But they take the reasoning one step further, focusing on the specific case of psychopaths and their diminished sense of moral empathy or responsibility. Hirstein and Sifferd effectively argue that the courts need to be practicing 'neurolaw' in order to monitor psychopathic prisoners more closely. Somewhere here there is also the danger of so-called 'brain-realism'. As per Dumit 2003 (see also De Vos, forthcoming and Schmitz, this volume), our society seems to place increased weight on brain data compared with other kinds of data; experimental philosophers have shown this to be in popular science presentations, but here, the concern is that brain scans and other pieces of such information will somehow trump other evidence in legal proceedings (Gordijn and Giordano 2010, discussed in Bickle and Hardcastle 2012).

Of the essays in this volume that touch on these issues, not all are univocally 'for' or 'against' these disciplines, then. Some are critical on strictly factual grounds, others at a more evaluative level. The contents are divided into three somewhat subjectively defined parts: Part I presents more conceptual and programmatic analyses, Part II more empirically oriented contributions, and Part III what I term 'evaluative' approaches – even though some of the essays explicitly address, e.g. the relation between conceptual and empirical approaches to a specific issue (be it embodied cognition, collaboration or neuroethics).

In **Part I**, Jean-Claude Dupont looks at the history and philosophy of the notion of 'memory traces', showing how an interplay between abstract models of cognition and experimental practice produces fruitful scientific developments on the vexed question of the material nature or basis of memory. (It is perhaps not a coincidence that the other contribution by a French author also includes a historical component: Denis Forest's discussion of Wundt and other nineteenth-century anticipations of modularity, pro and con.)

Stephen Gaukroger, in “Pain and the Nature of Psychological Attributes,” reflects on how to do justice to the intuition that it is people, not their brains or bodies, who are in pain, focusing on cases such as pains in phantom limbs, which, as he notes, have been taken since the formulation of Cartesian mind/body dualism to be especially revealing about the nature, location, and sources of pain in particular and sensation in general.

Jacqueline Sullivan suggests how it might be possible for a ‘Decade of the Mind’ to be successfully appropriated by neuroscience, that is, not as an insistence that the mind could *not* properly be thusly studied, but on the contrary, an extension and refinement of the neurophilosophical program. She shows through a variety of examples that paradigms intended to investigate complex cognitive functions have gradually been introduced into the cognitive neurobiological literature. Put more bluntly, one of Sullivan’s suggestions is that there is no particular innate opposition between the intentional stance and experimental neurological work (a very stimulating idea, which to this writer is faintly reminiscent of Enç’s remark in the early 1980s that functional language is present even within the reductive vocabulary of neurophysiology, e.g. ‘pain receptors’, hence there is no need to fear that functional concepts will somehow be ‘lost’ by integrating analyses from the neurophysiological level: Enç 1983).

Denis Forest’s analysis of neuroconstructivism as “a developmental turn in cognitive neuroscience?” asks the deceptively straightforward question: what happens when science focuses, not on the structure and functions of a developed brain, but on the developing brain, i.e., looking at how functional specialization and extrinsic properties are specified during brain development, with further suggestions for how this could benefit the philosophy of neuroscience, including the debate over ‘mechanisms’ and inter-level explanations.

Part II begins with two essays, each of which touch on embodiment and embodied cognition although in very different ways, as noted above.

John Symons and Paco Calvo’s “Computing with Bodies: Morphology, Function, and Computational Theory” argues that one of the most important constraints on computational theorizing in the study of mind is the initial determination of the challenges that an embodied agent faces. One of the lessons of an area of robotics known as morphological computation is that these challenges are inextricably linked to an understanding of the agent’s body and environment, with no need to have recourse to thought experiments.

Kellie Williamson and John Sutton’s “Embodied Collaboration in Small Groups” looks at the recent shifts within philosophy of mind and cognitive science, in which many theorists have broadened their questions and practices to focus on the complex and intricate cognitive and affective processes that spread beyond a single individual’s brain – distributed across the body and/or the environment, coopting objects and driving interactions with other individuals. They examine cases of skillful collaborative behavior and shared intentionality

notably in cases drawn from sport, illustrating embodied interactions (and , embedded, situated, distributed cognition) between team and group members. Again (like Symons and Calvo but also Bickle), Williamson and Sutton's emphasis is on how to build an analysis, not from a purely conceptual investigation but "via theorizing about real world contexts."

In his endearingly titled "Little-e eliminativism in mainstream cellular and molecular neuroscience: Tensions for neuro-normativity," John Bickle seeks to articulate a kind of eliminativism which would no longer be an ontological thesis (as in classical forms of reductionism) but a thesis "about the actual practices of current neuroscience," where certain molecular mechanisms for cognitive functions turn out to conflict with accepted cognitive-level explanations: this is eliminativism 'with a little e'. Bickle acknowledges that philosophers (and even some cognitive neuroscientists) will find it difficult to skip so many "levels" separating mind from molecular processes, he describes how many neuroscientists are doing exactly that, in their ongoing laboratory research. In a way that resonates with some of the other chapters (Robins, Schmitz and differently, Hirstein and Sifferd), Bickle notes that this 'little-e eliminativism' presents challenges to the neuro-disciplines, specifically, claims regarding 'neuro-normativitiy', because neuroethics and the related fields rely directly on cognitive explanations, and thus not be on solid ground neuroscientifically (compare De Vos, forthcoming).

William Hirstein and Katrina Sifferd, in "Ethics and the Brains of Psychopaths: The Significance of Psychopaths for Ethical and Legal Reasoning," suggest that the emerging neuroscience of psychopathy will have important implications for our attempts to construct an ethical society. In rather clearly normative terms, they advocate a usage of this neuroscience of psychopathy in the courts (among others).

Sarah Robins, in her essay "Memory Traces, Memory Errors, and the Possibility of Neural Lie Detection," asks a question which to some of us may sound as if it comes from a Philip K. Dick film adaptation: can there be a test for memories of a crime committed, i.e., 'neural lie detection'? In fact, she examines actual resources claiming to provide this feature ("Brain Fingerprinting," a type of neural interrogation of suspects), and shows that they depend on what she calls an Archival View of Memory, according to which the brain stores memory traces of particular past events. Instead she cites support for a 'constructive view of memory' – without however discounting outright the possibility that such techniques could be improved.

In **Part III**, Sigrid Schmitz puts forth a feminist analysis of the establishment and transformation of gender norms within neuroscientific research and "neurocultures." She uses the concept of brain plasticity to bring out its potential for deconstructing sex-based neurodeterminisms (like Cordelia Fine, as Schmitz notes), stressing the mutual entanglements of the biological and the social in brain-behavior development. Similar to what is advocated by the critical neuroscience theorists, neurofeminist research axiomatically questions the theoretical underpinnings of the empirical 'evidence' and

challenges the interpretation of findings. In an interesting resonance with Neidich's essay (discussed below), Schmitz takes the discourse of plasticity as a basis for reconstructing the concept of 'brainhood' and the articulation of normative demands for the cerebral subject in a neoliberal society.

Luc Faucher's "Non-Reductive Integration in Social Cognitive Neuroscience: Multiple Systems Model and Situated Concepts," also has embodied or 'situated' cognition make an appearance, with the particular case of the social cognitive neuroscience of race (or rather of racially prejudiced cognition). Faucher suggests that this discipline can integrate insights from the aforementioned theories. He additionally points to how this field combines reductionist strategies such as the usage of brain mapping studies, with an attempt to articulate a more heuristic model, which draws on a "socially situated and embedded theory of concepts."

Nicolas Bullot, in "History, Traces and the Cognitive Neuroscience of Art: Specifying the Principles of a Psycho-Historical Theory of Art," proposes a ("psycho-historical") theory of art, partly inspired by Dennett's 'intentional stance', which is meant to avoid the twin excesses of either radical neuroaesthetics (that is, a purported science which will find universal laws of aesthetic experience) or radical historicism (an exclusive emphasis on historical, interpretive or cultural context). In a way that resonates with the cognitive archaeology of Malafouris, but also with the more theoretical, speculative propositions of Neidich in this volume, Bullot argues that works of art are necessarily material traces of human agency.

The volume concludes with Warren Neidich's "The Architectonic of the Mind's Eye in the Age of Cognitive Capitalism." In an essay which brings together his own artistic practice and a number of both established and current neuroscientific themes, Neidich tries to move beyond the glorification of plasticity to a consideration of its socio-political determinants and ramifications, which he calls 'neuropower'. He defines the latter through a combination of the "re-routing of the long and short-term memories through working memory in the production of future decisions" and as a force acting on "the neural plastic potential of the brain in a living present," especially in the critical periods of development (for more on this aspect see Forest's discussion of neuroconstructivism), with the constant leitmotif of the intent to produce a conscripted and enrolled individual of the future.

The essays commissioned for this volume seek to broaden the field by dealing not only with neurophilosophical topics (Bickle, Sullivan, Robins, Hirstein and Sifferd) or more empirical matters (Forest, Williamson and Sutton, Symons and Calvo, the latter two of which give a new twist to the embodied, extended mind debates) but also with pain and personhood (Gaukroger), memory (Dupont, and again Robins), social cognition (Faucher), gender (Schmitz), neuroaesthetics (Bullot, Neidich). They are written by noted figures in their respective fields, and by bringing them together a newer and more refined picture of what 'brain theory' might mean, emerges.

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