Brain Self & Society
Working Papers

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

# The New Brain Sciences: Field or Fields?

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PAPER NO: 02
DATE: June 2008

BIOS
centre for the study of bioscience, biomedicine , biotechnology and society

Published by
BIOS (Centre for the Study of Bioscience, Biomedicine, Biotechnology and Society)
London School of Economics and Political Science
Houghton Street
London
WC2A 2AE



ISSN 2044-2785 (online)

***Brain, Self and Society*** *is a three-year project convened by Prof. Nikolas Rose and supported by the Economic and Social Research Council (London; UK), Grant Number RES-051–27–0194.* *http://www.lse.ac.uk/collections/brainSelfSociety/*

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- One of the hypotheses of the 'Brain, Self and Society' (BSS) project is that there is an 'emerging field' called 'the new brain sciences' and one of the objectives is to try to map that space of emerging knowledges, techniques, and technologies[1]. The present task is twofold[2]:
    a. First, to evaluate the claim, and explore whether that field of the new brain sciences can be characterized, defined and described;
    b. Second, to address the question whether it is relevant to speak of, or to question, the existence of a field of the new brain sciences.

- Many authors have spoken of the advent of 'the new brain sciences' or new sciences of the mind (Andreasen 2001; Rees and Rose 2005; Kandel 2006; Restak 2006; Iacoboni 2008). This claim is often taken for granted. In our initial proposal, we divided this 'emerging field' into the following sectors:
    a. molecular neuroscience
    b. psychiatric genetics
    c. neurogenesis
    d. brain imaging
    e. psychiatric drugs
    f. other neurotechnologies.

As new developments arise, such as systems neuroscience, connectomics and computational neuroscience, does this division still make sense? More fundamentally, what does it mean to speak of an emerging field of the new brain sciences? What is meant by 'field' here, and what are the criteria used to classify, group and divide a field of this type?

- It is not easy to identify or classify the various brain-related fields, trends and issues. There are many attempts to do so, and yet there is little agreement, on the nature and implications of such classification and clustering efforts, methods and methodologies. The boundaries of the brain sciences seem blurred. There is considerable overlap because of inter-disciplinary approaches and shared concerns and issues; the very designation of the discipline of 'neuroscience' per se is an exemplar of this. In addition, the boundaries have been reshuffling since the nineteenth century. We can observe a 'funnel-like' process with the emergence and re-emergence of new 'platforms' (Keating and Cambrosio 2003), convergence and divergence of specialties. For example, the field of biophysics was one of the key progenitors of neuroscience in the United States but can we say it plays the same role today with the rise of neuroimaging and other neuro-fields? On the other hand we have recently seen the (re)emergence of 'neuropsychiatry'; a field at the intersection of neurology, psychiatry and some add neuroscience (Martin 2002; Sachdev 2002; Sachdev 2005; Lee, Ng et al. 2008).

- While it initially seems reasonable to think of the new brain sciences as forming, at least in some respects, a unified field, it is also possible to view the field of the brain sciences as 'disunified' (Dupré 1993; Rosenberg 1994; Galison and Stump 1996; Galison 1997). As in physics , or indeed as in biology in general, the brain sciences consists of different cultures and 'sub-cultures' with 'trading zones' between the different platforms (Galison 1997). But disunification does not necessarily imply 'destabilization'. In fact, quite the opposite may be the case. The more the fragmentation, the greater the stability, perhaps because of an increase of 'optimization' or efficiency. Indeed, though seemingly evolving around one object of study (namely the brain), since the 1960s disciplinary areas and research fronts in the brain sciences increasingly focus on the elucidation of specific aspects, dimensions or functional properties of the brain, for example in the attempt to localize or map the pathways for specific features

[1] Nikolas Rose, 2007, ESRC-Proposal the 'Brain, Self and Society' Project, London School of Economics and Political Science. http://www.lse.ac.uk/collections/brainSelfSociety/ (Accessed August 5, 2008)
[2] This paper summarizes the conclusions of a longer paper. A copy of the full paper is available on request.

(cognition, memory, emotion …), social behaviours (religiosity, 'maternal love' …) or pathologies (anxiety, addiction…). In that sense we can perhaps talk about a 'laminated picture of intercalated practices'[3] of the brain sciences; in which references to 'the brain' – although referring to different conceptual objects – seem to hold together this cosmopolitan background of conceptual, technical, experimental and theoretical varieties.

- This disunity – or these disunities as Hacking (1996) puts it- becomes more apparent when we try to grasp the definition of a field and set its boundaries. In this task, we build on several approaches: among them Bourdieu's field theory, Latour's metaphysics, Galison's 'laminar history' of microphysics, Fleck's analysis in terms of 'thought-styles' and 'thought-collectives', Foucault's archaeological and genealogical approach and some bibliometric approaches.

- Bourdieu views the field as a space of struggle and distribution of capital (Bourdieu 1979; Bourdieu 1984; Bourdieu 1985; Bourdieu and Wacquant 1992; Bourdieu 1999; Lee, Ng et al. 2008). This makes sense in explaining for instance the struggle for 'governing the psychiatric field' in the 1960s that occurred between psychoanalysts and biologically-oriented psychiatrists.

- Latour's relational metaphysics (Latour, Woolgar et al. 1986; Latour 1987; Latour 1988; Latour 2005) destroys conventional boundaries between human and non-human 'agencies'. It thus shows how the conventional or canonical definition of a 'field' in science and technology cannot be sustained if one acknowledges the 'social, political, and economic' life of objects such as Prozac, Deep Brain Stimulation and PET scans and their transformative and performative role in field-building. For Latour, a clear-cut separation between the realms of science and that of politics is illusory. Any effort of unification or indeed disunification involves some political, cultural, epistemological, and ethical implications (Galison and Stump 1996), and if one redefines 'agencies' in a Latourian way any unification attempt becomes futile let alone self-defeating.

- The disunity is more apparent when trying to identify the different 'thought-styles' that characterize the diverse neuro-scientific communities built around specific disciplines and research fronts. This becomes clear if one examines the 1999 special issue of the *Brain Research Bulletin* (Dunnett 1999) that highlights the major achievements in neuroscience in the 20$^{th}$ century. The seventy or so short articles written by leading scientists from across the field of brain and neurobiological research touch on diverse theories, issues, and groundbreaking discoveries. If one focuses on each and every topic, one is confronted with different styles and schools of thought, diverse practices, distinct bodies of references, a variety of objects of study ('dream theory', 'vision', 'neuropharmacology', 'consciousness', 'reflexes', and so on). In addition, each of these areas has its own history of unification and disunification. The 'field of neuropsychology' for instance has a different and much broader scope in the first decade of the twenty first century than in the 1950s when it first brought together psychologists, neurologists, and psychiatrists (Boller 1999). Through the years there has been a clear shift in the nature of topics, their scope and methodological approaches: from symptoms and syndromes to more complex analyses of brain behaviour relationships to more specialized topics in memory, aging, dementia, and plasticity. This broader interest has been accompanied by a wider range of more sophisticated approaches cutting across molecular and imaging techniques. Even the population of interest has grown in scope to include adolescents, children, neonates, and experimental work on invertebrates and vertebrates alike, rodents are today prevalent in brain research. This shift in scope brought diverse specialized skills with their own languages, people and schools of thought within a seemingly homogenous field of 'neuropsychology.'

[3] In reference to Galison who uses the term to describe the different practices in the field of microphysics; theoretical, instrumental, experimental. Galison, P. L. (1997). Image and logic : a material culture of microphysics. Chicago, University of Chicago Press.

- Although defining the field of the 'brain sciences' might be as 'elusive' or at least as problematic as, for example, the definition of the field of 'systems biology' (Cowley 2004), it is still relevant to investigate the claim that there is a field of the new brain sciences for at least two reasons.
    a. First, the sense or belief that there is a field may shape the distinct philosophy of the actors involved and mobilized in that particular sphere of scientific inquiry. In the case of systems biology for example, the elusive field formulates one shared concern, namely a renewed interest in understanding biology and life in a more integrative manner through the conversion of divergent and sometimes antipodal fields. This could be understood as the characteristic 'thought-style' of system biologists. In the case of the brain sciences, it seems that there is not one culture but many cultures and sub-cultures and the challenge will be to identify these different thought-styles. Yet, having done so, it would still be worth seeing if there was, across this diversity, a belief that there is some common agenda, of which each considers itself to form a part – perhaps as embodied in the idea of a 'decade of the brain' or a 'final frontier'. Another common feature could be an underlying premise, perhaps what some have termed a neurologization or neurobiologization of selfhood (Changeux 1997; Changeux and Ricœur 2002; Rose 2003) or indeed a 'cerebralization' of the self (Ehrenberg 2004; Vidal 2005). There might also be the sense that there was a common neuroscientific project, that of a 'systematic investigation' of brain and behaviour (Shorter 1997). And there may also be a common conviction that the neurosciences, like the biological sciences in general, have an 'instrumental' ethos (Rosenberg 1994), less concerned with 'scientific realism' than with creating practices to 'control the environment' rather than imbued of 'scientific realism'.
    b. Second, as Bourdieu (1999) and others have shown, the scientific field is an entrepreneurial domain (Callon, Law et al. 1986) not solely driven by a disinterested pursuit for truth or the exhaustion of paradigms (Kuhn 1962). Rather, it is a space and locus of competitive struggles over monopoly of scientific competence, power, and authority. This is precisely because science is an ensemble of political investment and strategy backed up by a set of firms, institutions, and organizations let aside the pure disinterested and genuine scientific interest, involvement, contribution and achievement. Indeed some have suggested that the laboratory is the key site or focus of power in this territory: as the palace that was in the Renaissance the locus of power, so are laboratories today (Callon, Law et al. 1986). If we see here a field of struggle, that is to say of tensions and rivalrous transactions between different actors in a field of force, the properties of the field become an essential prerequisite to determine the positionality and distribution of capital between particular agents.

- We conclude by pointing out that the problem of defining a field of the brain sciences has broader implications that go beyond methodological or epistemological differences. Until the late nineteenth century, psychiatry and neurology for instance shared many similar objects of study; insanity being one of them. The division of the 'organic' and 'functional' disorders, of the psychoses and neuroses, and the emergence of a distinct speciality to deal with the minor mental troubles of everyday life played a key role in dividing up that field of conceptualisation and professional expertise, and one that had major conceptual, institutional and therapeutic consequences across the twentieth century. The re-emerging 'field of neuro-psychiatry' today reminds us that such limits and boundaries are always historically contingent, and shaped socially, culturally and politically. So if something is happening today, the question is: why then, why now?

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