

Neuroscience, Ethics and Society: a review of the field

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1. Introduction

The relationship between brain, mind, and personality has been a central topic for scientific, philosophical and moral inquiry at least since the Renaissance. However, the intensity of this debate has risen sharply in the past decade as our techniques for studying the functioning the brain in vivo and the range of technologies for making more or less subtle and local alterations to the brain and its functioning have begun to expand reasonably rapidly. There are a large number of now classical questions which are being reconstructed and reorganised, as well as new issues now emerging.

Examples of classical problems include:

- Brain death and the definition of death
- The concept of mental illness and the ethics of psychiatric treatment
- Brain function and personhood
- Localisation of brain functions, moral responsibility and the law
- Psychoactive drugs and mental enhancement

This list could easily be extended, and is merely indicative of the wealth of problems open for discussion. Similarly, source for thinking about the brain and the mind, and about technologies for understanding and modifying either or both, are very extensive. To consider philosophical sources alone, philosophers who paid close attention to medical and scientific inquiries into mind and brain include René Descartes, John Locke, Georg von Hegel, William James, Karl Jaspers, Maurice Merleau-Ponty and Karl Popper. And psychologists and neuroscientists have repaid the compliment by showing careful interest in, and in some cases adding significantly to, this philosophical literature. Examples of such philosopher-scientists include Sigmund Freud, Kurt Goldstein, A.R. Luria, John Eccles, Oliver Sacks and Jean-Pierre Changeux. We may also consider the fascinating field of interchange between philosophy and psychoanalysis, especially in French philosophy, involving such figures as Sigmund Freud, Jacques Lacan, Jean-Francois Lyotard, Gilles Deleuze and Félix Guattari, Paul Ricoeur and Michel Foucault. This indeed greatly oversimplifies the complex relationship between philosophy and psychology, so that, for example, Locke or James could equally well be classified as psychologists or as philosophers. The relationship between the brain sciences and the social sciences is considerably more complex again, and many people would assume that these stand in opposition to each other in their modes of constructing and interpreting what Martin Hollis called “Models of Man”. Yet the relationship between psychology and sociology in the nineteenth century was multifaceted and by no means hostile, and the complex history of the discipline of “social psychology” gives just one strand of the story of how we might think about the relationship between brain, mind and society.

Granted this rich historical context, it may be questioned whether current developments in neurosciences throw up genuinely new moral or social issues, or even whether they require a significant reorganisation of the ways in which we think about the classical problems. This sceptical thought needs to be kept in mind and returned to on a regular basis. We might observe that the same conceptual confusions or philosophical problems reappear time and again. The context in which they arise, their precise contours, the empirical evidence cited and the interrelationships between evidence and conceptual scheme vary over time and place, as do the social and technological factors shaping their salience and importance. Nonetheless the

continuities are remarkable. On the other hand, the forms of and relationships between these problems can be considered sociologically as much as philosophically. What anxieties or social tensions motivate the taking up or pressing of these problems or the development of technologies to address them? How are these technologies controlled and used, and by whom, to what ends, with what intended and unintended consequences? What shapes the judicial, governmental, educational or medical uptake of these technologies?

Against the sceptical challenge, and the purely sociological reconstruction of the field of “neuroethics”, we should note that a crucial driver here is what is technologically possible, materially available, and scientifically salient at present. Just as the techniques of gene sequencing and the study of “model organisms” and model populations with the techniques of modern molecular biology and epidemiology have made possible the great contemporary advances in genetic technology, so too the techniques of magnetic resonance imaging, stem cell therapies, transcranial magnetic stimulation, “smart” drugs, and behavioural genetics offer new prospects, both for understanding the brain and mind, and for altering them. It is possible – probable? – that as scientific evidence accrues and as technologies multiply and become more widely disseminated, the conceptual frameworks we have for thinking about brain and mind, and the social applications of these technologies and their cultural significance will change too.

To define “neuroethics” is difficult, given its Protean nature at the present state of the development of the field. It is easier to see it as a bundle of related strands:

- Ethical and social issues concerning the conduct of research in the neurosciences and biological psychology (including their clinical applications).
 - Typical issues here include the ethics of conducting research into novel interventions in the brain itself
- The ethical and social implications of the transformed “models of man” arising from the neurosciences
 - Typical issues here include the ethical and social import of the meaning and use of brain imaging in the courts or schools
- The ethical and social aspects of the clinical and public health treatment of psychiatric and neurological disorders in the light of modern research
 - Typical issues here include the use of psychopharmaceuticals to modify symptoms and behaviour without the consent or voluntary participation of the patient
- The implications of modern neuroscience for our understanding of the basis of morality and social behaviour.
 - Typical issues here include the transformations of our concepts of freewill and responsibility, and in our theories of the psychological basis of moral knowledge.

The rise of “neuroethics” as a field of multidisciplinary study is thus overdetermined, with causal influences including the intrinsic interest of the topic, the rapid technological changes in neuroscience and biomedicine, the precedent of the ELSI movement in genetics research, and the complexity of integrating neuroscience from the study of the physiology of neurons to social neuroscience, and of communicating an understanding of advances in neuroscience to the wider scientific and public audiences.

For practical purposes, neuroethics is a very recent arrival in the world of bioethics, and it does not appear that it has yet settled down to being “normal science” within that world. This stems in part from the sheer difficulty of neuroscience, in its breadth, complexity, and quantity of information to absorb. But it also stems from the relative maturity of philosophical discussions

of some of its central themes: bioethics has typically ignored the debates in metaethics, philosophy of mind and philosophy of science which are relevant to making sense of the neurosciences. And it stems further from a traditional discomfort social scientists have had with what they see as reductionism or naturalism in the explanation of individual or social behaviour. Thus, the literature in neuroethics to date suffers from a preponderance of review articles seeking to summarise current debates in neuroscience in order to get a purchase on how we might do useful ethical, legal, and social analyses of their content and implications. But, curiously, it also suffers from a sort of historical blindness to the fact that many of the issues now being raised in neuroethics have correlates in older debates (such as the debate about mind-brain identity or about the relationship between freewill, determinism and moral responsibility) which remain salient and do not require reinvention so much as rediscovery within bioethics. This is very clear when one reviews the conference proceedings of the major meetings so far held on this topic – under the auspices of the Dana Foundation, the (U.S.) President’s Council on Bioethics, the Royal Society and Gresham College, and the Wenner-Gren Foundation.¹ So far neuroethics has been little discussed in the mainstream bioethics journals, although this is changing (recent issues of the *American Journal of Bioethics* are an example of how this debate is moving in the U.S.A., and the *Journal of Medical Ethics* has a forthcoming special issue on this topic). But it regularly features in journals such as *Nature Reviews Neuroscience*. Neuroethics is still at the stage where it figures extensively as something of concern to scientists and discussed by scientists rather than being passed over to bioethicists (and there is no reason why this trajectory must or should be re-covered). But there are several themes, for instance the ethics and philosophy of psychiatry, which have long established and rich literatures, which are now coming to centre stage as models for thinking more generally about neuroscience.

In this background report we can give only a flavour of the literature in neuroscience, psychology, law, sociology, philosophy and bioethics, to give the reader an idea of the broad contours of contemporary debates and a sense of the open and interesting questions. Thus, this is not a systematic review in any sense. We have organised the material around five basic themes in neuroethics as it develops. Each section highlights a small number of subthemes, relates these in outline to relevant historical context, and indicates what we think are the key issues and some suggestions for future work.

¹ Dana Foundation *Neuroethics: Mapping the Field – Conference Proceedings* New York: Dana Press, 2002; Garland B (ed.) *Neuroscience and the Law: Brain, Mind, and the Scales of Justice* New York: Dana Press, 2004; Rees D, Rose S (eds.) *The New Brain Sciences: Perils and Prospects* Cambridge: Cambridge University Press, 2004; http://bioethics.gov/topics/neuro_index.html (The President’s Council)

2. Communication, choice and consent in clinical practice²

Central to the concerns of contemporary medical ethics is the question of valid consent to medical treatment. Endless pages have been written on the psychological and social preconditions for the capacity to consent, the informational requirements for consent, and the moral foundation of the requirement to seek consent to medical treatment in respect for autonomy. The relationships between these different inquiries into consent and the neurosciences are very rich.

2.1 Cross-cutting issues in consent

The first, and most obvious, cross-cutting issue in ethics and clinical applications of neuroscience is the classical debate on the ethics and philosophy of psychiatric illness and treatment.³ The general issue of the relationship between different forms of mental illness and disorder, and between certain kinds of neurological illness or injury, and the capacity to consent has been long discussed in medical ethics and mental health law. Discoveries in the neuroscience are having an impact on this discussion, both in giving finer grained scientific data relating to the precise kinds of lesions or malformations related to specific cognitive deficits relevant to consent, and in reframing psychiatric diagnostic criteria. The significance of this may be to limit the extent of psychiatric disease classifications, expanding the class of brains (if not behaviours) considered “normal”; or conversely to further extend the class of brains considered “abnormal” and hence the reach of psychiatric classification and, potentially, the power of psychiatrists. Additionally, the emphasis on examination of the structure and processes of the brain, and de-emphasis of mental symptom phenomena, may alter the kind of causal accounts given for abnormal behaviour, so that these are more materialist and more “proximal” than classical pathogenic accounts, which have tended to be more biographical, especially in the psychotherapeutic traditions. These issues will play a large role in the continuing debates about the possibility of treatment of psychiatric symptoms, and the role of coercive treatment in mental health as a matter of public health or social policy.

A second cross-cutting issue concerns the cognitive basis of consent.⁴ As neuroscience and cognitive science continue to converge, a richer account of the nature of consent founded in psychological research is being developed. It is conceivable that this will de-centre the idea of a simple threshold account of capacity to consent, according to which one can or cannot make a certain sort of choice, rather than being able to do so to a certain degree.⁵ Although it is unlikely

² A good review of many of the issues relating neural imaging to clinical psychiatry is Illes J (ed.) Ethical challenges in advanced neuroimaging. Special issue. *Brain and Cognition* 2002; 50(3): 341-523. See also Illes J, Racine E. Imaging or imagining? A neuroethics challenge informed by genetics. *American Journal of Bioethics* 2005; 5(2): 5-18 (and the peer commentaries that follow).

³ Bloch S, Chodoff P, Green SA (eds.) *Psychiatric Ethics* (3rd ed.) Oxford: Oxford UP, 1999; Puri BK, Brown RA, McKee HJ, Treasaden IH *Mental Health Law: A Practical Guide* London: Hodder Arnold, 2005

⁴ Berg JW, Applebaum PS, Lidz CW, Parker LS *Informed Consent: Legal Theory and Clinical Practice* Oxford; Oxford University Press, 2001

⁵ The *locus classicus* for this sort of thinking is the important precedent Re C, until the Mental Capacity Act (2005) the major legal framework for defining capacity to consent to medical treatment. See Montgomery J *Health Care Law* Oxford; Oxford University Press, 2002 (2nd ed.): 230-231

that the qualitative notion of capacity will be abandoned, in favour of a multifactorial and quantitative account of the components of capacity, in part for practical reasons, it may well be that greater attention is given to the external factors in a situation which enhance those components to “improve” decision-making.

A third cross-cutting issue concerns the nature of “good” decisions. Good decisions need, amongst other things, to be means-end rational, at least in the light of the ends the agent has. Cognitive psychology has known for a long time that decision-making is not always perfectly means-end rational, although there have been various strategies for showing that many apparent defects in means-end rationality are in fact rational from a strategic or dynamic point of view.⁶ Neuroscience is contributing much to an understanding of how means-end structured decisions are made at the biological level. However, good decisions frequently need to be more than means-end rational, and are frequently more complex than simple calculations of what is the best option, even metaphorically speaking. Neuroscience takes much more seriously than classical cognitive science the role of emotion in actual decision-making, and the ways in which emotions contribute to the quality of decisions (as well as to allowing people to make decisions that “cool reason” might have counselled against).⁷ More than this, many decisions need to be either socially coordinated, involving the operation of beliefs and decision-processes concerned with predicting and understanding the behaviour of others.⁸ And some decisions are moral decisions, such that what counts as a “good” decision is informed by cognitive states concerned with judgements of right and wrong.⁹

All three issues both motivate research programmes in neuroscience and psychiatry, and in their turn inform some of the current research and policy-making relating to consent, compulsory treatment, psychiatric care, and the use of psychiatric treatments therapeutically and prophylactically to modify behaviour, decision-making and the social and psychological development of children and young people.

2.2 The Limits of Consent and its Alternatives

Consent can also be of critical importance to neuroscience and psychiatry, in that much of the most important research into the neural features of mental illness or cognitive disorders depends on being able to obtain the consent of people whose capacity to give consent may be in question. For example, how far can best interests, advance directives, substituted judgement, or public interest tests be used in place of or in the absence of consent? In research settings, the standard approach is to consider first whether participation in the research is in the best interests of the subject; and if not, whether it is in any way contrary to their best interests.¹⁰ It is usual to ask whether the research could be carried out on any group *not* affected by this incapacity to consent, and whether the research will benefit, if not this particular person, other members of the same

⁶ A nice review and critique is Gigerenzer G, Todd PM, and the ABC Research Group *Simple Heuristics that Make Us Smart* Oxford: Oxford UP, 1999

⁷ The work of Antonio Damasio is emblematic here. Damasio AR *Descartes' Error: Emotion, Reason and the Human Brain* New York: Putnam, 1994. But the very different approach of Elster J *Alchemies of the Mind: Rationality and the Emotions* Cambridge: Cambridge UP, 1999 is also well worth digesting.

⁸ Blakemore SJ, Winston J, Frith U Social cognitive neuroscience: Where are we heading? *Trends in Cognitive Science* 2004; 8(5): 216-222

⁹ Casebeer W. *Natural Ethical Facts: Evolution, Connectionism, and Moral Cognition* Cambridge, Mass.: MIT Press, 2003.

¹⁰ E.g. Medical Research Council *The Ethical Conduct of Research on the Mentally Incapacitated* London: MRC, 1993

group. The arguments of principle here, as well as the appraisal of particular proposals, are quite difficult, and were at the heart of some of the crucial debates around the Council of Europe's Convention on Biomedicine and Human Rights.¹¹

In clinical practice, the issues about decision-making for the mentally incapacitated are a major policy issue, cutting across organ donation for transplantation, withdrawing and withholding treatment in people with severe brain injury or neurological disorders, the psychiatric and medical treatment of people with serious mental illness, the management of the financial and other personal affairs of incapacitated people, and so on. For most purposes, the policy response here has been to formalise a three-pronged approach of (a) advance directives and powers of attorney, framed while the person is still competent, (b) application of a best interests standard to the treatment of persons while mentally incapacitated, and (c) appointment of authorised representatives for the patient to make decisions on their behalf while incapacitated. The precise balance of these three elements is at the centre of debates on how best to frame law and policy in this area, as for example in the UK Mental Capacity Act (2005). The Mental Health Bill being developed at the moment is also relevant here.¹² From a neuroethics perspective, however, much of this debate is a side issue as these issues of policy do not appear to turn on facts about the structure of the brain, but rather on philosophical and social issues about the balancing of interests, the possibility of inferring what someone would have wanted, and so on. In some cases, neuroscience may better inform judgements about which conditions are susceptible of treatment or may possibly be reversible or remediable; and neuroscience will inform patients better about treatment, prognosis and prospects, which will inform their decision-making and the decision-making of those around them.

Consideration of the reform of mental health law may be outside the scope of this paper in the same way. However, such reforms do reflect wider trends which may affect what neuroscience information is sought and how it is used. For example, the emphasis in the current Mental Health Bill on preventive detention of people considered mentally ill but untreatable (for example, psychopaths believed to pose a serious danger to others even if unconvicted of any offense) has excited much debate.¹³ Neuroscience studies of the brains of psychopaths may dissolve the concept of psychopathy or refine it; and if the latter transpires, it is likely that neural imaging studies could be used as predictive tests of which people "pose a serious danger to others" even absent any behavioural evidence of such a danger. An important issue here is therefore how far neuroscience will extend the reach of powers of compulsory treatment, and indeed how far this might be a good thing. Debates about the relationship between protecting the public from danger and protecting citizens from undue interference in their lives, and the relationship between protecting cognitive privacy and preventing serious harm to third parties or the public good, continue to be inchoate and underdeveloped in public life.

Some discussions of the ethics of compelling treatment of the mentally ill tend naively to assume that one either has mental capacity (perhaps globally, or perhaps in a decision-relative way) or not. And if one has capacity compulsory treatment is wrong, but if one does not, the qualifying adjective "compulsory" is misleading, since treatment will be constrained by what is in the

¹¹ <http://conventions.coe.int/Treaty/en/Treaties/Word/164.doc>

¹² <http://www.dca.gov.uk/menincap/legis.htm> ;

http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/MentalHealth/MentalHealthList/fs/en?CONTENT_ID=4001816&chk=Tg1/Et;

¹³

http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/MentalHealth/MentalHealthArticle/fs/en?CONTENT_ID=4089590&chk=LmO2JW is a set of "common myths about the Mental Health Bill", suggesting that the Department of Health is fed up with this debate even to the point where it will admit that it is corporately fed up!

interests of the patient. Of course the dichotomy is false, and the assumption that treatment is always constrained by what is in the best interests of the patient is also false. Treatment or detention has always been possible on the basis that the patient poses a serious risk of harm to others. More interestingly, the tendency now is to dissolve the dichotomy between capacity and incapacity. Psychopathy is one example, wherein the ability to make rational decisions is unimpaired, on the standard theory of rationality, but the ability to consider the interest of others except insofar as they are relevant to the pursuit of the psychopath's own interests is defective or absent. Anorexia nervosa is another. Current thinking seems to consider anorexia as internally highly coherent and rational, thus that the anorexic patient may well be fully competent to make decisions. However, the values in play in the anorexic's decisions seem to outsiders to be pathological. Discussions of competence have tended to focus only on the means part of means-end rationality, leading to the paradox that we consider someone with anorexia both mentally ill and fully decision-competent.¹⁴ However, if we admit some sort of standard of coherence with what makes moral or evaluative sense to us into definitions of competence, then the very notion of the importance of personal autonomy as the foundation of consent seems to be under threat. An area which brings many of these concerns together is the area of drug addiction; contemporary debates on the ethical status of prophylactic or therapeutic vaccination against particular drugs of abuse provide a good seam for analysis and interpretation.¹⁵

The issue of how to think about alternatives to consent in the mentally incapacitated opens up the issue of whether there are other ethical protections of the interests of research subjects or patients than consent. The question of best interests suggests a broader question of whether consent is somehow the master test of the acceptability of a treatment or research protocol, or whether other ethical norms apply. For instance, if I give full, informed consent to take part in a risky research project, does that mean that the project can proceed with me as a subject, or might other ethical constraints apply? This repeats a nineteenth century debate in labour law on freedom of contract. In this debate, the main issue was whether the state should interfere in contracts between employer and employee to make contracts invalid which did not secure minimum conditions of health and safety at work. Proponents of freedom of contract felt that the state had no right to interfere, that this would create unemployment, and was an improper restriction on would-be workers' rights to make bargains according to their own autonomous preferences. Critics of freedom of contract felt that this was a naïve view of workers' ability to negotiate "fair" contract terms and conditions of employment. The critics of the freedom of contract doctrine held that there were external standards of fairness, related to the unfairness of the imposition of risks to life and health beyond a certain level. Advocates of freedom of contract held that fairness was a function of the free bargaining between employer and employee, and it was unfair to restrict that bargaining.¹⁶ In the research context, we can argue whether it is fair to prevent people from taking part in risky research if they feel it is in their own interests to do so (and there is a similar debate about the justice of offering people payment to take part in research, seen by many as an improper inducement to undertake risks for the "wrong" sort of reason). Examples might

¹⁴ Tan J. Conduct and compassion: The anorexia talking? *Lancet* 2004; 362: 1246. Giordano S. *Understanding Eating Disorders: Conceptual and Ethical Issues in the Treatment of Anorexia and Bulimia Nervosa* Oxford: Oxford UP, 2005. See also the debate between Giordano and Draper in *Bioethics* 2003; 17(3): 261-289, and Draper H. Anorexia Nervosa and Respecting a Refusal of Life Prolonging Therapy: A Limited Justification *Bioethics* 2000; 14(2): 120-133

¹⁵ Hall W, Carter L Ethical issues in using a cocaine vaccine to treat and prevent cocaine abuse and dependence *J Medical Ethics* 2004; 20: 337-340

¹⁶ Kong WM Legitimate requests and indecent proposals: matters of justice in the ethical assessment of phase I trials involving competent patients. *Journal of Medical Ethics* 2005; 31: 205-208. See further Atiyah PS *The Rise and Fall of Freedom of Contract* Oxford: Oxford UP, 1979.

include patients with Parkinson's Disease wishing to undergo highly experimental treatments with neural stem cells.¹⁷

2.3 Key Questions

- How can neuroscience usefully inform clinical assessment of capacity to consent? Or does it in some way undermine the usefulness of the notion of capacity?
- What are the practical implications of having a value-based standard imported into the notion of capacity in the examples of psychopathy, anorexia or drug abuse?
- What are the likely impacts of neural imaging in preventive strategies in clinical and public health psychiatry?
- Is neuroscience undermining psychotherapeutic approaches in psychiatry?

¹⁷ Dekkers W, Boer G Sham neurosurgery in patient's with Parkinson's disease: Is it morally acceptable? *J Medical Ethics* 2001; 27: 151-156

3. The ethics and regulation of research

3.1 *The ethics of research: principal dimensions*

The main dimensions of analysis of the ethics of research into basic science new technologies could be labelled the ethics of curiosity, research integrity, and (classical) research ethics.

3.1.1 The ethics of curiosity

The ethics of curiosity is the ethical appraisal of asking particular research questions – that is to say, the appraisal of the ends of scientific research.¹⁸ In the domain of neuroscience, this engages with some of the deep philosophical questions about the meaning of discoveries about the brain, its structure and functions, its relationships with mind and soul and society, and the various ways of modifying the brain and its behaviour. One example of this sort of question, at its highest level of abstraction, is asking whether the very paradigm of neuroscience research in *H. Sapiens* undermines human dignity, by reinforcing a materialist and determinist conception of humanity. To pose this question is to question whether the very enterprise of neuroscience is immoral. In practice, this question is never posed as starkly as that, if only because many of the purposes of neuroscience are unquestionably humane, such as the investigation of cures or palliatives for brain injury or disease. But occasionally one does find the question answered, without being posed, as when Patricia Churchland writes:

Bit by experimental bit, neuroscience is morphing our conception of what we are. The weight of evidence now implies that it is the *brain*, rather than some non-physical stuff, that feels, thinks, and decides. That means there is no soul to fall in love. We do still fall in love, certainly, and passion is as real as it ever was. The difference is that now we understand those important feelings to be events happening in the physical brain. It means that there is no soul to spend its post-mortem eternity blissful in Heaven or miserable in Hell.¹⁹

Consequently, one can ask – if so inclined – that if that is what neuroscience research leads one to think, then should one pursue it? This question can be framed in many ways, but one interesting feature of contemporary bioethics is that this *kind* of question is hardly ever considered to be part of bioethics, at least in the English speaking, non-religious world.²⁰ This may surprise some people: investigations into psychiatry, neurology and psychology have often

¹⁸ An interesting exploration of some of these questions, which is something of a neglected classic, is Jonas H *The Imperative of Responsibility: In Search of an Ethic for the Technological Age* Chicago: University of Chicago Press, 1985. See also Callahan D *What Price Better Health? Hazards of the Research Imperative* Berkeley: University of California Press, 2003

¹⁹ Churchland P.S. *Brain-Wise: Studies in Neurophilosophy* Cambridge, Mass.: MIT Press, 2002: 1. There are of course other philosophical questions here, such as the way neuroscience findings can or cannot be considered evidence for metaphysical theses concerning the nature of the mind. Compare Churchland's discussions with those in Bennett MR and Hacker PMS *Philosophical Foundations of Neuroscience* Oxford: Blackwell, 2003, for example. Meanwhile, for the authors in Bechtel W, Mandik P, Mundale J, Stufflebeam RS (eds.) *Philosophy and the Neurosciences: A Reader* Oxford: Blackwell, 2001, these questions of mind and brain are *almost* considered irrelevant, with the focus instead being on specific issues in cognitive science.

²⁰ Although this thought clearly inspires some critiques of “reductionism”, “materialism” or “disenchantment of the lifeworld”.

been at the heart of inquiry into what makes us human. But as the history of ethical, legal, social and policy issues in genetics suggests, the reduction of questions of the ethics of curiosity to questions of the ethics of means alone is part of a normal, if, for Evans, regrettable, trajectory of rationalisation of the field of research.²¹

Another kind of question within the ethics of curiosity is the kind concerned with the ends of specific pieces of research. Current debate surrounds the problem of “dual use” technologies, meaning both technologies with both civil and military applications, and technologies with both offensive and defensive military applications. Should certain kinds of research not be carried out because of their potential (offensive) military applications? Should research with potential military applications not be published, or disclosed only under certain conditions?²²

A traditional solution to this debate has been to demarcate very strongly the domain of pure inquiry from the domain of technological application; the former being understood to be governed by no ethical standards other than those of research integrity (see below), the latter being understood to be governed by the ethical standards applicable in society at large.²³ This is the solution widely accepted in relation to nuclear technology, both civil and military, in the scientific community and in government. But wide acceptance perhaps marks only a default, and not a universal and principled acceptance. Technologies such as neuro-imaging based lie detection, or the development of pharmaceuticals to suppress the need for sleep, would have important applications in the basic science of cognitive psychology and chronobiology.²⁴ But they would also have clear and controversial social and military applications. One debate here is whether this controversy should be averted “upstream” by restricting the kinds of questions neuroscientists should ask, either by self-regulation or by the imposition of external ethical norms, or “downstream” by methods of regulating access to and use of these technologies once developed.

The other principal area we can consider part of the “ethics of curiosity” relates to the ethics of specific research programmes involving a controversial methodology or type of research “material”. Good examples of this include the ethics of research involving animals, and the ethics of research on embryos, fetuses, embryonic or fetal cells or structures, and vulnerable or incompetent born humans, such as young children, the seriously mentally ill, or prisoners.²⁵ While at least some of these issues are more normally considered part of “classical research ethics” (see below), at the heart of this other debate is the question of whether the ends of the research justify the ways in which this “material” or these “subjects” are used. For instance, many people would consider that some of the key discoveries in neuroscience can only be (or have been) achieved through research on animals, and the justification for much research on human embryonic stem cells is their promise for future treatment. Yet at least some people have categorical objections to using animals or embryos in research, such that if this is the only way to get a certain kind of information, we will have to do without that information. Although many philosophers are getting quite tired of how little (philosophical) progress has been made in

²¹ Evans JH. *Playing God: Human Genetic Engineering and the Rationalization of Public Bioethical Debate, 1959-1995* Chicago: University of Chicago Press, 2002

²² The literature is vast, but see for instance The Royal Society and The Wellcome Trust *Do No Harm: Reducing the Potential for Misuse of Life Science Research* (2004) <http://www.royalsoc.ac.uk/displaypagedoc.asp?id=13647>

²³ Merton RK The normative structure of science in Merton RK *The Sociology of Science: Theoretical and Empirical Investigations* Chicago: University of Chicago Press, 1973, ch.13

²⁴ Foster R, Kreitzman L *Rhythms of Life* London: Profile, 2004

²⁵ Again, the literature is vast, but see Nuffield Council on Bioethics *The Ethics of Research Involving Animals* London: Nuffield Council on Bioethics, 2005; Klotzko AJ (ed.) *The Cloning Sourcebook* Oxford: Oxford UP, 2003; Foster C *The Ethics of Medical Research with Humans* Cambridge: Cambridge UP, 2001

resolving this kind of issue, there remain enormously rich fields for social inquiry in better understanding how prevalent these categorical objections are, how they are framed, how they relate to other socio-moral attitudes, and how people use the kinds of arguments in play in the debates.

3.1.2 Research integrity

Research integrity concerns the ethics of the conduct of scientists in relation to other scientists and in relation to their conduct of and reporting on their research.²⁶ Standard issues include research fraud, authorship practices, disclosure of results, sharing of standards, resources and techniques, training practices, and so on. In the neurosciences, as in genetics, one crucial question concerns the interpretation of data and the use of such interpretations in the media, in funding applications, and in the spinning off of research findings into commercial propositions. The temptation to overinterpret, or to produce speculative interpretations which will be interesting, fame- or money-spinning, is strong both as a psychological pressure, and as a pressure on scientists seeking funding to support their laboratories. As Martin and Hedgecoe have discussed, the kind of “hype” associated with biotechnology is in fact an intrinsic part of the research and development process in contemporary funding conditions.²⁷ Given this, the idea that there is a simple ethic, Dragnet-style, of “just the facts, ma’am” is naïve, even were the idea of theory-free data thoroughly discredited now.²⁸ For this reason, a code-based ethic for research integrity is unlikely to be productive, although at a low level specific prescriptions regarding publication ethics have proved useful.²⁹ Instead, current thinking is that a focus on the moral character of the scientist, in the form of a virtue ethics for scientists, is more likely to be useful. This will rely on rich accounts of specific, consensually accepted, good practice, and on the interpretation of specific instances of scientific (moral) excellence or (moral) mediocrity or inadequacy. And this in turn will be informed as much by studies in the history, sociology and anthropology of science as by committees of experts or philosophers.³⁰

Illustrative examples of problems for scientific integrity in the neurosciences include: the interpretation of findings in behavioural genetics or imaging studies into the basis of traits such as criminality, risk-seeking, intelligence, racial, sexual or gender difference; and the ability or otherwise to publish findings adverse to the interests of one’s research sponsor, especially in government or commercially-funded research.

3.1.3 Classical research ethics

When most people think of research ethics they think of issues concerned with consent, confidentiality, research ethics committees, vulnerable subjects, guidelines and so on.³¹ Thus it is not a surprise that the great bulk of the literature, and of practical discussion, is restricted to

²⁶ Resnik DB *The Ethics of Science* London: Routledge, 1998

²⁷ Hedgecoe, A. and Martin, P. (2003) *The Drugs Don’t Work: Expectations and the Shaping of Pharmacogenetics*. *Social Studies of Science*. 33(3) p327-364

²⁸ Churchland P.S. *Neurophilosophy: Toward a Unified Science of the Mind-Brain* Cambridge, Mass: MIT Press, 1986, ch.6.4

²⁹ Ashcroft RE *The Genealogy of Scientific Ethics* University of Cambridge PhD thesis, 1995 (available on request from author).

³⁰ For instance see Rabinow P, Dan-Cohen T *A Machine to Make a Future* Princeton: Princeton UP, 2005, Shapin S *A Social History of Truth* Chicago: University of Chicago Press, 1994; Shapin S *Ivory Trade*. *London Review of Books* 11 September 2003

³¹ Ashcroft RE. The ethics and governance of medical research: What has regulation to do with morality? *New Review of Bioethics* 2003; 1(1): 41-58

the important practical question of how to protect the rights and interests of the parties involved in research as subjects. On a liberal view, society may have only limited interests or rights to interfere with the questions scientists ask, or how scientists treat each other. But society certainly does have an interest in protecting vulnerable subjects from harm, especially where that harm may have no justification on the basis of those subjects' vital personal interests.

The field of "classical" research ethics is thus the field of ethical appraisal of the impact of research participation on subjects of research, broadly construed. This includes both people whose bodies are subject to invasive procedures, and people whose contact with research is no more than that some of their personal data are compiled into an aggregated, anonymised data set. Traditionally, classical research ethics was concerned mainly with invasive medical and physiological research, and secondarily with the ethics of some psychological, social psychological and anthropological research. Given the breadth and importance of classical research ethics, this deserves a section in its own right.

3.2 Classical Research Ethics and the Neurosciences

A useful, if debated, way to think about the scope and function of classical research ethics is to consider the history of the ways in which research subjects have been harmed, abused or wronged in the context of research. Psychiatric and neurological patients have, it can be argued, been wronged in a number of ways connected with research. First, people with mental health or brain injury problems have been subjected to a range of treatments with no research or science-based rationale to support them, sometimes in the teeth of evidence that the treatments in question were dangerous or ineffective. A strand of this history is the argument, widely rehearsed in the antipsychiatry movement of the 1960s and early 1970s, that the treatment of the mentally ill rested on an inadequate conceptualisation of mental illness – in some cases, an argument being mounted that there was no such thing, so that any treatment "for" a mental illness was *eo ipso* abusive.³² Psychiatrists and their critics continue to debate the extent to which psychiatric theory is adequate to psychiatric phenomenology, and the extent to which psychiatric treatments are actually treatments for well-defined disorders with a good causal story linking disorder to behaviour and treatment to cure of the disorder, as opposed to symptom management or behavioural control alone.³³

Second, psychiatric and neurological patients have been considered – on occasion – a useful "resource" for research entirely unconnected with their illness or their interests, simply on account of their confinement and availability. The most notorious examples of this concern the Willowbrook State School for the Retarded study involving severely learning disabled children being deliberately infected in a study of hepatitis and the Jewish Chronic Diseases Hospital study involving severely demented patients being injected with live cancer cells.³⁴ In neither case was there any connection between the mental or neurological condition of the subjects and the research conducted.

³² Kotowicz Z.R.D. *Laing and the Paths of Anti-Psychiatry* London: Routledge, 1997

³³ Fulford KWM *Medicine and Moral Theory* Cambridge: Cambridge University Press, 1986; Fulford KWM, Morris K, Sadler J, Stanghellini G (eds.) *Nature and Narrative: An Introduction to the New Philosophy of Psychiatry* Oxford: Oxford University Press, 2003; Bolton D, Hill J *Mind, Meaning and Mental Disorder: The Nature of Causal Explanation in Psychology and Psychiatry* Oxford: Oxford UP, 1986

³⁴ Rothman DJ *Strangers at the Bedside: A History of How Law and Bioethics Transformed Medical Decision Making*. New York: Basic Books, 1991.

Third, psychiatric and neurological patients have often been involved in research connected with their mental or neurological disorder, but where it has been debated whether the research was conducted in their best interests. For example, it is open to debate whether the intention of using antipsychotics to control the “challenging behaviour” (sometimes including serious violence) of some people with severe learning disability is best considered an intervention in the interests of the person treated, or rather whether it is better considered an intervention in the interest of the care-giver or other patients.³⁵ If the primary intention is indeed not the benefit of the person treated, there is a question of ethics as to whether this is justifiable. Further, in the research context, this question of ethics has a pendant – can this be justified within this trial, and can the trial be justified at all if the treatment under trial is potentially unethical? The alternative questions are, of course, if the treatment is being used absent evidence of its (in)effectiveness, would not a trial be preferable to uncontrolled “empirical” use of the treatment into the indefinite future? And what are the alternatives to the treatment and the trial?

Research involving persons who are cognitively impaired requires special ethical consideration because such ‘vulnerable persons’ may not be capable of providing informed consent³⁶. They may not be able to understand the rationale behind a clinical trial, understand exactly what is required of them and why or be able to give their free and informed consent to participate in the study. There is debate as to how stringent the laws should be on obtaining consent and whether or not they impose restrictions on research that potentially represent a violation of the patients’ right to treatment, though others are more concerned with the patients’ right to freedom and privacy. Whether or not drug-dependent people are vulnerable persons or not is questionable and most debate has centred on the schizophrenic condition.

Much of this debate is entirely classical within the ethics of psychiatry and research ethics. Very little is new to neuroscience research, although some of the issues do appear in new combinations. For example, the traditional justification for animal research in pharmacology is that the animals used in research are an unfortunate sacrifice in the service of an important goal, which cannot be reached in any other way, viz., the development of new treatments for devastating human diseases (and occasionally for animal diseases as well). However, if the explicit aim of some research in psychopharmacology was to develop a safe form of ecstasy (MDMA) for recreational use, then it would be significantly more difficult to justify the use of animals in such a research programme. Even the claim that such research should be considered a “harm reduction programme” might not be sufficient. This is in any case not an “a priori” question, but one that calls for social investigation – what sort of ends for research are important in society, how would different actors invoke them in argument, what factors and processes go into the “balancing” of the harms and benefits of research. Although some scholars have attempted to set out at least a qualitative framework for risk/benefit trade-offs in research, there is much work to be done here.³⁷

³⁵ Ashcroft RE, Ahmed Z, Kerr M, Fraser W. The ethics of evidence-based medicine: A randomised trial of antipsychotic drugs for challenging behaviour in learning disability. *J Med Ethics* 2001; 27: 338-343

³⁶ Hall W, Carter L Ethical issues in using a cocaine vaccine to treat and prevent cocaine abuse and dependence. *J Med Ethics* 2004; 30: 337-340. Charland L. Cynthia’s dilemma: Consenting to heroin prescription *Am J Bioethics* 2002; 2(2): 37-47

³⁷ Weijer C, Miller PB When are research risks reasonable in relation to anticipated benefits? *Nature Medicine* 2004; 10: 570-573

A more obviously neuroscientific issue in research ethics concerns the use of imaging techniques.³⁸ This has a number of elements which are centrally concerned with privacy. First, there is the question of whether neural imaging is privacy-violating (actually or potentially) in some important sense. While the idea that imaging allows us to “see” thoughts is absurd, at least for the foreseeable future if not in principle, the possibility that imaging allows us to see the functional correlates of the psychological moves involved in lying or deception is not. Supposing that a well-defined set of neural imaging correlates of lying is defined, then when using neural imaging for some purpose in psychological research it could be more or less immediately apparent to the researcher when the imaging subject is lying, even if the topic of the research is something quite different. Since part of the ethics of research involves seeking only the information required in the research, this could be considered a foreseeable, if unintended, breach of privacy. Of course, the researcher might have a duty of confidence as well as a duty not to breach privacy, but that is not the point. Given the complex social phenomenology of lying, it is hardly clear that a researcher has a right to know whether the subject is lying which might vindicate them coming into unwitting possession of this information. Moreover, aside from the conceptual difficulties in identifying what precisely is to count as a lie and under what circumstances, there are long-standing questions about the ethics of using a technology to detect lying, in the courts, in interrogation, or for other purposes, and whether evidence obtained in this way would or should be admissible or usable in making police inquiries.

Second, there is the question of whether using neural imaging technology in research allows another kind of breach of privacy, the revelation to third parties that one is a member of some particular stigmatised group. For example, if a neuroscientist is interested in the neural structures involved in moral decision-making, that researcher may well wish to have access to prisoners or psychiatric patients known or suspected to have some deficit in moral reasoning. On the one hand, this is something which the subject may not wish others to know beyond strict necessity. Prisoners do not absolutely forego their right to privacy: it may be a matter of public record that they committed certain offences, but it is not, usually, a matter of public record that they have a particular kind of brain lesion or mental disorder. On the other hand, that a certain person is taking part in Dr X’s research study may be enough to label them both as a person with a particular brain lesion, and as a person with a particular kind of disorder, and as a prisoner or psychiatric patient. This sort of information may well be apparent to third parties coming into casual contact with the subjects, aside from the prison or hospital authorities and the researcher and his or her team. This kind of breach of privacy is of course a normal risk in any kind of psychiatric or criminological research, but of particular interest here is the additional labelling that may result from being seen as not only “bad” or “mad” but also or instead as “brain damaged”. It should also be noted that, as in other forms of medical research, research investigations can also reveal diagnostic or predictive information which was not intentionally sought, and this can have major implications for the research subject (particularly when that subject has been recruited as a “normal control”).³⁹

Third, there is the breach of privacy involved in the way in which certain kinds of brain imaging scans can allow the reconstruction of the facial image of the person scanned.⁴⁰ Thus, just as genetic information can be used to identify someone, in spite of its apparently anonymous

³⁸ The most up-to-date discussions of this are the papers by Illes and Racine, and Wolpe, Foster and Langleben in the *American Journal of Bioethics* 2005; 5(2), and the associated peer commentaries.

³⁹ Illes J, Desmond JE, Huang LF, Raffin TA, Atlas SW. Ethical and practical issues in managing incidental findings in functional magnetic resonance imaging. *Brain and Cognition* 2002; 50: 358-365

⁴⁰ Garland B Neuroscience and the Law: A Report in Garland B (ed.) *Neuroscience and the Law; Brain, Mind, and the Scales of Justice* New York: Dana Foundation, 2004 (at p.36).

character, so too can neural imaging datafiles be used, albeit with considerable technical difficulty. Thus assurances about the privacy and confidentiality of collections of neural images may require additional protections to block unauthorised access, or unauthorised processing, in addition to the apparent non-identifiability of the data itself.⁴¹

This last issue has a further connection with a currently important issue in genetics, viz. the nature of durable consent to use and reuse a given data set in a series of research projects, some of which may be as yet unknown or undefined. Just as genetic samples can be of long-term use, especially if they can be linked to other sorts of data, so too could neural images be of long-term use. And the same problems of long term reuseability apply: the difficulty of defining the scope and duration of consent, the problem of when recontact of donors can be permitted or is obligatory contingent on future research findings, the question of ownership and control of research data and research samples or image banks; the problem of whether data or sample banks can be made available to third parties or traded on for cash or benefits in kind.

3.3 Research Governance

The issues raised in this section pose some challenges for research governance, although not, in our opinion, many which are genuinely novel and specific to neuroscience research. The crucial problems may be the level of awareness of research ethics committees and research managers of the issues of neuroethics and the specific challenges they pose, the awareness of research subjects of the ways their interests may be affected, and the impact of neuroscience on conceptions of mental and behavioural problems which will reflect back on decisions about trade-offs between individual rights and interests and societal rights and interests.

3.4 Key Questions

- How far are debates in neuroethics continuations of the debates on the ethics of psychiatric treatment, criminal justice approaches to drug abuse, jurisprudential approaches to the use of lie detection technologies, and so on? What, if anything, is the significance of this “re-badging” of these issues as neuroethics issues?
- How can we best understand issues here grouped under the heading of “ethics of curiosity”? What sort of issues does society take to be fundamental to the continuation of society, or to be matters of private conscience, or otherwise? How are questions of the moral validity of ends used in public debates about animal research or research involving human embryos? What factors influence an issue becoming more or less publicly negotiable?
- What are the possible governance responses to “dual use” technology problems in the R&D phase? How best should the behaviour of scientists in respect of this type of technology be governed? How does or should this play out transnationally in the case of neurotechnologies or psychopharmaceuticals?

⁴¹ Greely HT Prediction, Litigation, Privacy, and Property: Some Possible Legal and Social Implications of Advances in Neuroscience in Garland (ed.) (op. cit. n.40): ch.8

4. Changing accounts of behaviour

Neuroscience is helping reconstruct expert and lay ideas of behaviour, mental illnesses and deviance, and is challenging long-established social explanations of human agency. Previous claims that important aspects of human behaviour and personality were biological in origin centred on competencies such as intelligence, but the rise of evolutionary psychology and other forms of evolutionary thinking now see all aspects of human behaviour as having an important genetic component. These include ‘normal’ human characteristics, such as altruism, co-operation and sexuality, as well deviant behaviour, including mental illness and addiction. The focus of this section will be on the latter, whilst the search for genetic factors involved in personality disorders and criminality are discussed at more length in section 5.2 below.

A growing number of studies have been established in the last decade to search for genetic factors that may be involved in a number of common psychiatric and neurological conditions, including Parkinson’s, Alzheimer’s, schizophrenia, obsessive compulsive disorder, manic depression, autism, eating disorders and ADHD. The main aim of this research has been to identify the genes involved in a condition in order to develop new therapies and diagnostic test. Genetic testing might then be used to identify people at high risk of getting a psychiatric disorder or neurodegenerative condition so that they could be given prophylactic drug treatment. Genetic association studies, often based on large genetic databases, have been used to correlate symptoms with specific genetic markers. However, after promising initial results in a number of cases, it has proved difficult to replicate many of these findings and establish validated genetic markers.⁴² As a consequence, it is now widely recognised that understanding the genetic underpinning of complex mental disorders will not be a simple matter of identifying the genes involved or pinpointing anomalies in fMRI scans. Instead, it will require investigation of how the “...disease disrupts the parallel distributed processing that underlies relevant aspects of thinking, emotion and motivation”.⁴³ This is a huge task and will require the integration of many different disciplines.

Addiction is another area that has attracted a large amount of neuroscience research, with addictive behaviour increasingly seen as having an important genetic and neurobiological basis.⁴⁴ According to Hall, Carter and Morley: “Neuroscience research on addiction promises to transform the long running debate between moral and medical models of addiction by providing a detailed causal explanation of addiction in terms of brain processes.”⁴⁵ Whilst simple causal models are rejected, it is clear that biological accounts of addiction are in the ascendancy within the scientific literature.

There have also been some efforts to investigate other forms of undesirable behaviour. For example, a number of fMRI studies have started to look at the social psychological responses associated with race and have suggested that there are unconscious cognitive processes involved

⁴² Anon. 2005. Genetics of psychiatric disorders. *Nature Neuroscience*,8(6):693

⁴³ Hyman S E. 2000. The genetics of mental illness: implications for practice. *Bulletin Of The World Health Organization* 78(4): 455-463.

⁴⁴ Volkow N D. and Li TK. 2004. Science and society - Drug addiction: the neurobiology of behaviour gone awry. *Nature Reviews Neuroscience* 5(12): 963-970; Hall W., Carter L. and Morley KI. 2004. Neuroscience research on the addictions: A prospectus for future ethical and policy analysis. *Addictive Behaviors* 29(7): 1481-1495.

⁴⁵ Op cit

in racial bias.⁴⁶ This work is controversial and is still at an early stage, but has drawn interest from the media. One implication that has been highlighted is that racial prejudice has an evolutionary origin. For example, a press release issued by Arizona State University to accompany an academic paper had the headline ‘Human prejudice has evolved’ and asks ‘Could it be that the tendency to be prejudiced evolved as an adaptive response to protect our prehistoric ancestors from danger?’⁴⁷ This type of interpretation of the available data is driven by a commitment to an evolutionary model and presents human behaviour, such as racism, as being somehow intrinsic.

The increasing geneticization and neuralization of behavioural disorders is creating a new model of human kind which has major implications for mental health care, the criminal justice system and social policy more generally. Many of the ethical issues raised by this research have been discussed in the Nuffield Council on Bioethics’ report on *Genetics and human behaviour: the ethical context*⁴⁸. The main problems identified in this report and by a number of other commentators include the:

- Idea that genetic and biological accounts undermine personal responsibility, our sense of freedom and lead to a ‘genetic fatalism’, and in doing so pose a threat to human dignity;
- Further medicalisation of behaviour;
- Possibility of new forms of stigma;
- Creation of new categories of individuals who are seen to be ‘at risk’, and are subject to surveillance and medical intervention;
- Pressure to introduce genetic screening programme to select particular traits and characteristics.

Some of the potential consequences of the development of genetic tests based on this new knowledge are nicely summed up by Nikolas Rose:

“Once we have identified individuals at risk/ with a predisposition we can engage interventions to reduce the risk: psychopharmacology, gene therapy, environmental control, skills in life management, cognitive restructuring. The example of ADHD in the US suggests the likelihood of proposals for genetic screening of disruptive schoolchildren, with pre-emptive treatment a condition of continuing schooling.”⁴⁹

However, despite the serious issues raised by these scientific developments, it is important to keep several things in mind. Firstly, there has been a long-standing critique of the move towards biological accounts of human behaviour. These can be traced back to the controversy surrounding socio-biology in the 1970s and have focused on evolutionary psychology in the last decade⁵⁰. Central to these criticisms is the argument that inherent in biological accounts of behaviour is a reductionism that sees human interaction in largely mechanistic terms that ignores the social embeddedness of behaviour. The long tradition of work on interaction within the social sciences has demonstrated that the nature of social action and how it is understood cannot be

⁴⁶ Eberhardt J L. 2005. Imaging race. *American Psychologist* 60(2): 181-190.

⁴⁷ See http://www.asu.edu/news/research/prejudicestudy_053105.htm

⁴⁸ Nuffield Council 2002. *Genetics and human behaviour: the ethical context*. London: Nuffield Council on Bioethics

⁴⁹ Rose N. 2000. The biology of culpability: Pathological identity and crime control in a biological culture. *Theoretical Criminology* 4(1): 5-34

⁵⁰ This debate has been called the Darwin Wars. Examples of critiques of evolutionary psychology include Rose H. and Rose S. (Eds) 2000. *Alas, Poor Darwin: arguments against evolutionary psychology*. London: Cape; Malik K. 2000. *Man, Beast and Zombie: what science can and cannot tell us about human nature*. London : Weidfeld and Nicolson.

separated from its social context. Secondly, recent studies of technological innovation in the field of genetics and genomics have shown that talk of ‘revolutionary’ change is misplaced and that the process of translating new scientific knowledge into practice is slow and incremental, with many promising scientific ideas never reaching the market.⁵¹

4.1 Changing ideas of free will, agency and responsibility -

4.1.1 New accounts of human intentionality

Since the Libet et al. studies in 1983 revealed that conscious intention to act follows the initiation of an action, there has been a ‘deep problem’ at the root of volition and other studies have agreed. It seems that the frontal and parietal lobes form a circuit that monitors motor plans in advance of action, producing a conscious experience of intention as part of this simulation. “The question remains, why do subjects perceive some movements as chosen, consciously, when this conscious sense of choice appears to lag behind movement initiation?”⁵²

Philosophically there are two, related problems here. Firstly there is the metaphysical problem of the possibility or impossibility of freedom of the will, which has been with us since the Seventeenth Century. Most philosophers today favour a “compatibilist” view, according to which determinist and “libertarian” accounts of free action are in fact not in contradiction. Most moral philosophers also try to avoid the supposedly problematic implications of determinism or compatibilism by holding that the question of whether my actions are completely causally determined is irrelevant to the question of whether I should be held responsible for them in moral life or in the courts.⁵³ However, the fascination of the problem, and the unintuitive nature of its “solution” to most people, means that the debate is unlikely to ever quite die out.⁵⁴ Second there is the problem in philosophy of science of how to interpret the sort of findings reported by Spence, and how to make sense of how far they allow us to “see” willing in action: the sceptical thought being that if we can see it, it ain’t *willing*.⁵⁵ One response to this thought is to say that all that this shows is that our “folk psychology” is both incoherent on its own terms and inconsistent with the evidence.⁵⁶ An alternative is to say that, on the contrary, folk psychology is not a theory that can be refuted, but rather the lens through which *any and all* our interpretation of evidence must be seen.⁵⁷

⁵¹ Nightingale P. and Martin PA. 2004 The Myth of the biotech revolution. *Trends in Biotechnology*. 22(11):564-569

⁵² Spence SA, Hunter MD et al. Neuroscience and the will. *Current Opinion in Psychiatry* 2002; 15: 519-526,

⁵³ See, for instance, Strawson P Freedom and resentment in Watson G (ed.) *FreeWill* (second edition) Oxford: Oxford University Press, 2003: ch.4

⁵⁴ Watson G (ed.) *FreeWill* (second edition) Oxford: Oxford University Press, 2003; Kane R (ed.) *Oxford Handbook of Free Will* Oxford: Oxford University Press, 2005. A nice tour d’horizon is Lipton P Genetic and generic determinism: A new threat to free will? In Rees D, Rose SPR (eds.) *The New Brain Sciences: Perils and Prospects* Cambridge: Cambridge University Press, 2004: ch.5

⁵⁵ For instance.: You can see me raising my arm intentionally. But that doesn’t mean that you can “see” an intention as such.

⁵⁶ This is roughly the view of Patricia Churchland; see her *Neurophilosophy: Toward a Unified Science of the Mind/Brain* Cambridge, Mass.: MIT Press, 1986 and *Brain-Wise: Studies in Neurophilosophy* Cambridge, Mass.: MIT Press, 2002

⁵⁷ This is the view of MR Bennett and PMS Hacker in their *Philosophical Foundations of Neuroscience* Oxford: Blackwell, 2003

4.1.2 Mind reading and lie detection

One of the applications of the new neurotechnologies that has received the most attention is the possibility of using brain imaging and related technologies to ‘read the mind’ and even to detect when people are lying. This prospect has aroused a mixture of anxiety and awe about the power of current scientific and technical developments, but in many ways is not a new endeavour. In the 19th century the Italian criminologist Lombroso was the first to attempt lie detection by measuring changes in blood volume during interrogation of a suspect and in the early 20th century Benussi investigated the relationship between a variety of physiological factors and lying. However, it wasn’t until 1921 when John Larson combined the measurement of blood pressure and breathing rate that the first modern polygraph was developed.⁵⁸ Contemporary efforts to create new forms of lie detection have centred on fMRI and EEG, and have received significant funding from the U.S. Department of Defence for possible military and security applications.

Although lie detection using functional imaging and EEG is not technically possible at present, a number of important scientific advances have indicated that this may, in principle, be possible in the future. In fMRI studies lying responses have been associated with increased activation in bilateral, ventrolateral, prefrontal and anterior cingulate cortices and with delayed response, indicating longer processing time.⁵⁹ However, it should be noted that these studies have limitations in that they do not accurately model real-world lie-telling scenarios. Perhaps the most publicised of the new lie detection techniques is ‘Brain Fingerprinting’ based on EEG.⁶⁰ It is claimed that this can detect if a subject is familiar or unfamiliar with a stimulus, and can be used with the tests already developed for the polygraph. The technology is being promoted for a range of forensic, medical, advertising and security applications.

Despite this promise, all techniques of this sort suffer from a number of serious limitations. Firstly, there still remain serious technical difficulties, which mean there is no guarantee that improving the measurement technique will result in greater overall performance. The methods used to evoke lying behaviour; the control question test (CQT) and the guilty knowledge test (GKT) are neither particularly sensitive nor specific, generating a high level of false positives.⁶¹ Furthermore, current state-of-the-art fMRI scanners do not have adequate temporal resolution to capture the fleeting brain state of deception. Secondly, the brain state associated with lying is likely to be a ‘complex, situation dependent activity’⁶² and falsification, fabrication, deception and misrepresentation may not refer to the same behaviour or brain state. In addition, to a large extent lies are both culturally and socially constructed, with their meaning heavily depending on social context.⁶³ For example, sometimes people feel it is right to lie in order to spare another

⁵⁸ Grubin D. and Madsen L. 2005. Lie detection and the polygraph: A historical review. *The journal of forensic psychiatry and psychology* 16(2):357-369.

⁵⁹ Spence SA., Hunter MD. et al. 2004. A cognitive neurobiological account of deception: evidence from functional neuroimaging. *Philosophical Transactions Of The Royal Society Of London Series B-Biological Sciences* 359(1451): 1755-1762.

⁶⁰ Wolpe PR., Foster KR, et al. 2005. Emerging Neurotechnologies for Lie-Detection: Promises and Perils. *The American Journal of Bioethics* 5(2): 39-49.

⁶¹ Fischbach RL. and Fischbach GD. 2005. The brain doesn’t lie. *American Journal of Bioethics* 5(2):54-55

⁶² Wolpe PR. Foster KR, et al. Op cit.

⁶³ Buller T. 2005. Can we scan for truth in a society of liars? *American Journal Of Bioethics* 5(2): 58-60.

person's feelings. It may therefore be that what is detected by the scanner is not the intention of lying, but the knowledge that it is not what we ought to be doing?⁶⁴ In other words, human interaction is always socially situated and the meaning of a particular action can only be understood in a given cultural context. The idea of mind reading rests on the idea that there is some universal absolute meaning that can be read off from brain scans irrespective of the social situation. This may not turn out to be the case.

Despite these important, and potentially irreconcilable limitations, new forms of lie-detecting technologies have raised a number of important social, ethical and civil liberties issues within the emerging neuroethics literature, including:

- Inappropriate use - competition for funding may lead researchers to introduce new technologies into practice (e.g. in anti-terrorism measures) before they are fully validated and without adequate resources or staff training;
- Privacy - If the technology for lie-detection could be developed to a point where it can be used covertly, what right does the individual under mental surveillance have to knowledge of his monitoring?
- Collateral information - If someone is to undergo lie detection what right to privacy do they have for personal information not relevant to the crime; sexuality, racial attitude, mental health vulnerabilities, political leaning etc.?

In response to these potential threats, there have been calls that all new forms of lie-detection should not be used for socially important applications until their capabilities and limitations are adequately understood. Furthermore, there have been calls that “for the first time we...need to define the parameters of a person's right to ‘cognitive liberty’ the limits of the state's right to peer into an individual's thought processes without his or her consent.”⁶⁵

4.2 New accounts of criminality and anti-social behaviour

The nineteenth century Italian criminologist, Cesare Lombroso, has often been credited with being the first person to argue on scientific grounds that criminals are born, not made⁶⁶. In 20th century eugenics, criminality was linked with feeble-mindedness, insanity, alcoholism or prostitution in a single degenerate and heritable identity. The search for genetic determinants and biological markers of criminality has continued to this day and one area that has attracted considerable attention has been psychopathy and severe forms of personality disorder. Antisocial personality disorder (ASPD) is an established, but contested form of personality disorder, which is defined in terms of the wanton disregard for conforming to social norms. An ONS survey in 2000 found that 63 per cent of males on remand, 49 per cent of males sentenced and 31 per cent of all female prisoners had a diagnosis of ASPD. Despite its prevalence, problems in establishing a firm diagnosis exist and the condition is widely held to be untreatable. This makes it difficult to firmly establish as a medical condition, with the subjective nature of its diagnosis prompting both clinical and policy concerns.

⁶⁴ Op cit.

⁶⁵ Boire RG. 2005. Searching the brain: The fourth amendment implications of brain-based deception detection devices. *American Journal Of Bioethics* 5(2): 62-63. p63

⁶⁶ Abbott A. 2001. Into the mind of a killer. *Nature* 410(6826): 296-298.

The growing anxiety surrounding severe forms of personality disorder has led to the creation of a new medico-legal category, that of ‘Dangerous Severe Personality Disorder’ (DSPD) and the introduction in 2004 of a Draft Mental Health Bill which sought to establish this category in law. The Bill has become the focus of much clinical and political debate as it proposed that individuals diagnosed with DSPD could be legally detained prior to any conviction. Many mental health professionals have been strongly opposed to this new legislation, arguing that public health is being conflated with crime prevention.

In parallel with these developments, there have been attempts within neuroscience to identify biomarkers, such as anatomical changes and genetic alterations that could be used to help the diagnosis of severe forms of personality disorder⁶⁷. Inherent to this research agenda is the belief that these disorders have an organic, and even genetic, basis and that they should be seen as a form of illness rather than socially and morally unacceptable behaviour. However, if criminals are born and not made, are they responsible for their acts? Should they be penalised when their biology has compromised their capacity to make moral judgements? Does this mean that medical treatment is more appropriate than punishment? As the Nuffield Council notes:

‘If progress in behavioural genetics were to be such that close and clearly identifiable associations between particular genetic variants and particular forms of antisocial acts were to be demonstrated, there would be a case for a re-examination of the legal implications’.⁶⁸

Throughout the 20th century courtrooms have seen attempts to admit biological evidence to support claims for diminished responsibility. For example, the cases of XYY men in the 1960s and 70s; Pre-menstrual syndrome women in the 80s, CAT and PET scans in the 80s and 90s; MAOA and family history in the 90s have all attempted to establish some biological basis for criminal or anti-social behaviour. However, these have largely failed to displace conceptions of responsibility, which operate within the practice of the criminal law in any jurisdiction:⁶⁹

“The courtroom display of physical inscription – a PET scan or a DNA profile – has a greater rhetorical force...but the effects of the trial process are to expose the messy complexity that lies behind such sanguine assertions of truth...there is no reason to suppose that brain imaging, neurochemical and genetic arguments will not be subjected to the same destabilization if they begin to enter the accusatory trial process on a regular basis”.⁷⁰

James’ recent empirical study on the use of neuroscientific ideas and evidence in the criminal justice system confirms this view and demonstrates the importance of well established procedures for admitting and assessing expert evidence limits the impact of relatively new knowledge claims.⁷¹

⁶⁷ Raine A, Lencz T, Bihrlé S, LaCasse L and Colletti P 2000. Reduced prefrontal grey matter volume and reduced autonomic activity in antisocial personality disorder. *Archives of General Psychiatry*, 57(2): 119-127; Raine A, Buchsbaum M, LaCasse L. 1997. Brain abnormalities in murderers indicated by positron emission tomography. *Biological Psychiatry*, 42(6): 495-508.

⁶⁸ Nuffield Council. Op cit

⁶⁹ Rose N. 2000. The biology of culpability: Pathological identity and crime control in a biological culture. *Theoretical Criminology* 4(1): 5-34.

⁷⁰ Rose N. Op cit

⁷¹ James H (2005) Unpublished PhD thesis on Criminal responsibility, abnormal mental states, and the functions of expert medico-psychological evidence. University of Nottingham

Despite the very real limitations that are placed on the practical utility of new neuroscientific ideas within the criminal justice system, there has been extensive discussion of the issues these developments raise for the law. In 2004 a special issue of the *Philosophical Transactions of the Royal Society of London* was devoted to 'law and the brain'⁷² and covered topics such as the:

- Basis of criminal responsibility;
- Impact of neuroscience on normative judgements in law and justice;
- The potential for neuroscience to clarify the difference between deception and self-deception in the hope of making such determinations less focussed upon the juror's and judge's opinions.
- The impact of neuroscience on notions of punishment

However, it remains to be seen if the diffusion of neuroscientific knowledge and technologies into the criminal justice system will start to change legal principles.

Key Questions

- Can we develop new metaphors and ways of representing the highly complex interaction between the biological, social, cultural and environmental factors that shape human behaviour in order to avoid crude dichotomies and forms of reductionism?
- How should the use of biological information that relates to an individual's disposition towards certain types of behaviour be governed?
- How might evidence from neuroscience research be evaluated and used within the criminal justice system? What implications might changing concepts of agency have for lay and professional ideas of justice and criminal responsibility?

⁷² *Philosophical Transactions of the Royal Society of London* (series B) 2004. 259

5. Experience and identity

5.1 The experience of neurotechnologies

An important theme in UK ELSI work on genetics has focused on the experience of either suffering from a genetic disorder or of being diagnosed with one⁷³. The latter is very relevant to the discussion here, as it relates directly to the use of new technologies. In particular, it highlights how knowledge is created and used in local settings, and the different meanings it may have for patients and clinicians. This strand of research is part of a tradition of work within medical sociology and medical anthropology on lay accounts of illness and the experience of receiving medical care. In contrast, relatively little is known about the experience of the new neurotechnologies, with the notable exceptions of the use of some psychopharmaceuticals and genetic testing for Alzheimer's Disease. Having said this, there is an established body of personal accounts and social science work on the experience of what might be called 'old neurotechnologies' within psychiatry, such as earlier generations of drug therapy (major and minor tranquilisers) and ECT. It is therefore important to set more recent studies of the experience of new neurotechnologies against the historical background of accounts of mental suffering, and the problematic relationship between patients and psychiatry.

Given that relatively few of the new neurotechnologies described in this report have entered clinical practice or diffused beyond healthcare settings, little evidence exists to evaluate if some of the claimed benefits or potential problems discussed in the neuroethics literature are significant to end users. Some work is currently underway to investigate the issues raised by pre-symptomatic testing for early onset Alzheimer's Disease (AD) and the potential impact this may have on people taking the tests and their families.⁷⁴ Genetic testing for alleles of APOE can identify people at greater risk of developing late onset AD. However, given the probabilistic nature of the test and lack of any effective therapy for the condition, this knowledge has relatively little clinical value at present and risks causing distress. For this reason, there is a *de facto* moratorium on clinical APOE testing in most of North America and Europe⁷⁵

Perhaps the group of new neurotechnologies with the most known about patient experiences of use are psychopharmaceuticals, such as Prozac and Ritalin. These accounts have been widely

⁷³ Atkinson PA, Parsons E, Featherstone K. 2001. Professional Constructions of Family and Kinship in Medical Genetics. *New Genetics and Society* 20(1):5-24; Scott S, Prior L, Wood F, and Gray J. 2005 Repositioning the patient: the implications of being 'at risk' *Social Science and Medicine* 60 (8):1869-1879; Michie S, Bobrow M, and Marteau TM 2001 Predictive genetic testing in children and adults: a study of emotional impact. *Journal of Medical Genetics* 38 (8): 519-526

⁷⁴ Roberts JS, Barber M, Brown TM, Cupples LA, Farrer LA, LaRusse SA et al. 2004 Who seeks genetic susceptibility testing for Alzheimer's Disease? Findings from a multisite, randomized clinical trial. *Genetic Medicine* 6:197-203.; Roberts JS, LaRusse SA, Katzen H, Whitehouse PJ, Barber M, Post SG et al. 2003 Reasons for seeking genetic susceptibility testing among first-degree relatives of people with Alzheimer disease. *Alzheimer Dis Assoc Disord.* 17:86-93.

⁷⁵ Post SG, Whitehouse PJ, Binstock RH, Bird TD, Eckert SK, Farrer LA, Fleck LM, Gaines AD, Jeungst ET, Karlinsky H, Miles S, Murray TD, Quaid KA, Relkin NR, Roses AD, StGeorgeHyslop PH, Sachs GA, Steinbock B, Truschke EF, and Zinn AB. 1997. The Clinical Introduction Of Genetic Testing For Alzheimer Disease – An Ethical Perspective. *Journal of the American Medical Association* 277(10): 832-836; Relkin NR., Kwon YJ., Tsai J. and Gandy S. 1996. Consensus Statement: Apolipoprotein E Genotyping In Alzheimer's Disease' *Lancet* 347:1091-1095; AGS Ethics Committee 2001 Genetic Testing for Late-Onset Alzheimer's disease, *Journal of the American Geriatric Society* 49:225-226.

discussed and have provoked controversy about the boundary between therapeutic and non-therapeutic use of mood altering drugs. In Peter Kramer's much cited book *Listening to Prozac*⁷⁶ he describes how some of his patients felt as if they had undergone a transformation in their personality when taking Prozac. In a now famous phrase, they felt "better than well". This is a very different narrative compared to earlier accounts of other drugs that affect mood, such as the benzodiazepines, which have tended to stress the negative aspects, including side-effects, addiction and lack of appropriate medical supervision.⁷⁷

Kramer and others have drawn on these experiences to raise important questions about the nature of personal identity and the social and ethical consequences of drug-based enhancement⁷⁸: When is someone normal? Is the individual's personality more 'authentic' when they are taking medication or when they are not? Should we allow anyone who would like to enhance their mood or cognitive abilities to take drugs of this sort? What are the social implications of doing so?

Debates surrounding the cosmetic or lifestyle use of drugs such as Prozac have drawn on the distinction that arose in early discussions about gene therapy between therapy and enhancement. It is argued that there is a clear difference between therapeutic uses of a technology to treat disorders such as depression, and their use to improve the mood or cognitive functioning of healthy individuals.⁷⁹ According to Singh:

"The term 'enhancement technologies' has been used to describe those treatments that improve human performance, appearance, and/or behavior where such improvement is not medically warranted (or financially justified given limited resources). In light of this distinction, legitimate medical intervention is viewed as morally justified and necessary, while enhancement treatments are viewed as excessive, artificial and morally suspect."

A number of other medicines have also been linked to the idea of cognitive enhancement, including the wakefulness promoting drug modafinil, which can reduce the need for sleep and a number of drugs used in the treatment of Alzheimer's that may help improve memory. Already there is evidence that Ritalin is widely used in US colleges to help students concentrate when taking their exams.

In attempting to answer the difficult questions raised by the possibility of neurochemical enhancement, a number of objections have been raised, including⁸⁰:

- Potential safety problems with the long-term use of drugs in healthy individuals;
- The possibility of direct or indirect coercion to take enhancement drugs: already there are reports of US pilots taking drugs during the Iraq war to help improve attention and alertness. In the case of the use in children of stimulants like Ritalin, there are major issues about the rights of the child to refuse medication;
- Access to enhancement technologies is likely to be expensive and will not be distributed equally. As a consequence, some social groups will not have access to the potential benefits they offer;

⁷⁶ Kramer P. 1993. *Listening to Prozac*. New York: Penguin

⁷⁷ For a selection of books and personal accounts see <http://www.benzo.org.uk>

⁷⁸ Wolpe PR. 2002. Treatment, enhancement, and the ethics of neurotherapeutics. *Brain And Cognition* 50(3):387-395; Farah M J, and Illes J, et al. 2004. Neurocognitive enhancement: what can we do and what should we do? *Nature Reviews Neuroscience* 5(5):421-425.

⁷⁹ Schwartz PH. 2005. Defending the distinction between treatment and enhancement. *American Journal Of Bioethics* 5(3):17-19.

⁸⁰ Farah MJ. and Illes J. op cit.

- More fundamentally the use of enhancement poses a threat to social values, by undermining the worth and dignity of hard work and pathologies normal attributes.

In the philosophical literature, the question of the distinction between enhancement and treatment has been controversial for some time. Although the discussion is perhaps now mainly concerned with psychopharmaceutical “enhancements”, the debate also appears in the context of cosmetic surgery, and indeed outside the medical context in discussions of the invention of needs or wants by advertising. Hence, underlying these debates on new technologies in medicine, there are more profound cultural debates about the authentic self, its manipulation by malign or amoral external forces, and the morality of different practices of the care of the self.⁸¹ Given that this plays on such subtle and complex social and cultural ideas it may be unsurprising that a clear treatment/enhancement distinction, any more than a clear disease/malaise or mad/bad distinction, is so hard to identify. The best philosophical efforts have centred on attempts to link accounts of treatment and enhancement to accounts of normal, subnormal and supranormal “species-typical” functioning.⁸² Yet this attempt to biologise the goals of medicine and to use this to demarcate the “truly medical” from the “truly cosmetic” has yet to generate a satisfactory consensus. This has wide ramifications in terms of the attempt to construct an account of health and disability in theories of justice and social welfare, as much as in accounts of regulation and professionalism.⁸³

These issues have been most keenly debated within the bioethics literature in relation to the use of Ritalin and the treatment of ADHD.⁸⁴ However, relatively little is known about the experience of taking this drug. In one of the few empirical studies of its kind, Singh investigated parent’s narrative justifications for giving Ritalin to their children and showed that moral ideas played an important role in guiding their decisions and actions. In particular, therapeutic decisions are “...embedded in valued cultural ideals about masculinity, self-actualization, and success, as well as in moral conceptions of authenticity and personal freedom.”⁸⁵ However, parents’ different constructions of authenticity question its validity as a transcendental moral category and highlight the need to ground ethical debate in their social context.

5.2 *New forms of identity*

A potentially significant social impact of the new neurosciences is the formation of new forms of personal and social identities. Nikolas Rose has analysed the rise of psychopharmacology and the way this particular solution to mental health problems is being promoted by the pharmaceutical industry.⁸⁶ One result of this is the creation of new forms of identity and ‘selfhood’ in which “It seems that individuals themselves are beginning to recode their moods and their ills in terms of the functioning of their brain chemicals, and to act upon themselves in the light of this belief.”⁸⁷ This links directly to the use of drugs such as Prozac and the way in which they can fundamentally change the way we feel about and represent ourselves.

⁸¹ Elliott C *Better than Well: American Medicine Meets the American Dream* New York: WW Norton, 2003

⁸² Nordenfelt L. *The Nature of Health: An Action-Theoretic Approach* Amsterdam: Kluwer, 1995

⁸³ Daniels N. *Just Health Care* Cambridge: Cambridge UP, 1985; Buchanan AR, Brock DW, Daniels N, Wikler D *From Chance to Choice: Genetics and Justice* Cambridge: Cambridge University Press, 2000

⁸⁴ Kamm FM. 2005. Is there a problem with enhancement? *American Journal Of Bioethics* 5(3):5-14; Singh I. 2005. Will the "real boy" please behave: Dosing dilemmas for parents of boys with ADHD. *American Journal Of Bioethics* 5(3):34-47.

⁸⁵ Singh I. Op cit; p34

⁸⁶ Rose N. 2003. Neurochemical selves. *Society* 41(1): 46-59.

⁸⁷ Op cit; p59

New knowledge can also reinforce, reconstruct, or undermine widely held cultural ideas about what it is to be normal or abnormal. This can challenge forms of discrimination and stigma, or can alternatively, create new forms of social division, which form the basis of inequality. For example, the claim that homosexuality is determined by the so called ‘gay gene’ was welcomed by a number of gay rights groups as proof that their sexuality was not a matter of personal choice. This undermined claims from some Christian groups who saw homosexuality as an individual preference and could therefore be altered. In the area of mental health, there is evidence that some schizophrenic patients welcome a diagnosis based on fMRI scanning, as the belief that the condition is a disease with a clear organic basis is felt to be more socially acceptable⁸⁸.

In contrast, claims that some gender differences are genetically determined and have arisen as a result of evolutionary pressures had proved highly controversial, as they are seen to reinforce established gender relations. Similarly, the idea that personality traits such as shyness and anxiety are biologically determined has been criticised as another example of the medicalisation (or ‘neuralisation’) of what many see as essentially psycho-social phenomena, caused by living in an increasingly stressful society.

It is interesting to reflect on the implications of new accounts of behaviour for the broader cultural understanding of what has been historically called ‘human nature’. Earlier work in human behavioural genetics, which saw some forms of behaviour as genetically determined by a small number of genes, led to claims that key human characteristics were ‘hardwired’ (i.e. fixed and immutable)⁸⁹ and that aggression, competition and even sexual violence was ‘natural’. For critics of evolutionary psychology, these ideas have been seen as a reflection of, and justification for, an established social order based on an aggressive form of male dominated Anglo-Saxon capitalism. However, contemporary work in the neurosciences presents a more fluid and socialised idea of human nature, in which many aspects of behaviour are shaped by both biological and social factors, and human social co-operation, and even ethical behaviour, is naturalised and seen as having a biological basis.⁹⁰ This illustrates a key point coming from the cultural analysis of the neurosciences, namely that given the lack of hard evidence for a particular idea of human nature, the conceptual models that are built not only represent scientific evidence and ideas, but are also shaped by powerful social norms and the dominant culture.

Key Questions

- How should the experiences of people using the new neurotechnologies be incorporated into ethical debates and policymaking?
- How should the non-medical use of psychopharmaceuticals be regulated? Who should have responsibility for drawing the boundary between appropriate and inappropriate use – consumers, the medical profession or the state?

⁸⁸ Cohn S. 2005. Taking neuroscience upstream: the curious case of biological constructionism. Paper given to meeting on *Emerging perspectives on the new brain sciences*, LSE, London 10th September 2005

⁸⁹ Clark WR, and Grunstein M. 2000. Are we Hardwired? The role of genes in human behaviour. Oxford: OUP

⁹⁰ Gazzaniga MS. 2005. The ethical brain. New York: Dana Press

- Should neuroscientists be more careful in (responsible for?) how they present their work in order to avoid misleading ideas about the biological basis of human behaviour and identity becoming popularised?

6. The ethics and regulation of emerging technologies

6.1 Risk and Regulation

The regulation of technologies is now a major area of research in sociolegal studies. Regulation encompasses many different ways of socially managing the use of technologies, including such practices as education, licensing, surveillance, prohibition, and audit, and such institutions as schools, the courts, parliament, and professional or quasi-professional organisations.⁹¹ A major focus of this literature is on the practices and institutions of regulation, rather than on the technologies regulated. And a major focus of the study of such regulation is the way in which regulatory strategies seek to produce, oversee, or control behaviour in order to manage risk. In addition to the management of risk, regulatory strategies are often devised in the light of the economic theory of imperfect markets: regulation seeks to overcome information imperfections or asymmetries.

This approach to regulation and governance may seem unusual to those coming from a bioethics background. Bioethics has traditionally focussed on specific technologies, seeing the technology as the locus of worry, rather than the users of the technology. This goes some way to explain why bioethics tends to reinvent itself around each new innovation – stem cells, embryo research, genetics, neuroscience. Bioethics has also tended to focus on individual behaviours and responsibilities, whereas regulatory theory tends to take a systems approach. Of course, the picture is more complicated than this, as bioethics has also tended to assume that technologies per se are intrinsically morally neutral. It may be that this is an internal contradiction, pointing to the incoherence of bioethics in the face of the social. Be that as it may, bioethics shares with regulation theory a concern with risk, especially risk of harm. Many bioethical analyses of new technologies are designed to analyse how far a new technology introduces a qualitatively new personal or communal risk, and how far the risks associated with the new technology are greater or lesser quantitatively than existing risks patients or citizens are prepared to assume in other domains of their lives.

Recent analysts of the sociology of risk have concentrated on how discourses and practices of risk management are designed as much to produce certain kinds of behaviour and attitudes toward risk, as they are to control or reduce risks.⁹² They have also broadened out the focus from technical risks (such as those considered in engineering or biosafety) to social, economic and cultural risk. Other aspects of risk analysis to consider include the distinction between risk considered quantitatively (where the impact and its probability have some measurable features) and risk considered qualitatively. Thus we can talk about the risk that the use of neuroimaging in pre-employment health screening will involve unjust discrimination – this is unlikely to be quantifiable, even conceptually, and is a qualitative risk. Or we can talk about the risk of death associated with taking a particular kind of drug for several years – this is almost certainly measurable, to some level of reliability, and is a quantitative risk. Finally, we can consider the way in which different “circuits of risk” interact. For example, we might be concerned about the risk of violent crime – for example the quantitative risk that crimes of violence will occur with a

⁹¹ A good textbook is Baldwin R, Cave M *Understanding Regulation: Theory, Strategy and Practice* Oxford: Oxford University Press, 1999. A useful reader is Baldwin R, Scott C, Hood C *A Reader on Regulation* Oxford: Oxford University Press, 1998.

⁹² Rose N *Powers of Freedom* Cambridge: Cambridge University Press, 1999; Power M. *The Audit Society* Oxford: Oxford University Press, 1997

certain incidence in a particular community in a given time period. And we can also be concerned with the risk of deprivations of civil liberties in a particular community associated with a particular crime prevention strategy (arguably this is a qualitative risk) And further we can be concerned with the risk of false convictions and imprisonment due to a certain crime detection strategy (this is likely measurable, thus quantitative). And these three risks will interact in complex ways. Hence, the design of a governance regime for a particular technology (or its associated social practices and institutions) will need to consider the various circuits of risk within which the technology sits.

6.2 Examples of Neurotechnologies to be Regulated

The most obvious examples of neurotechnologies to be regulated would be psychoactive drugs of various kinds. We might speak of axes of regulation; for instance: medical/non-medical; therapeutic/enhancing; low/medium/high risk; socially approved/disapproved; and so on. We might also consider where these drugs fit into existing social practices, or how far they represent a challenge to those practices. One way to understand the regulation of a new psychoactive drug is to see where it fits on the different axes of regulation. Thus a safe Ecstasy substitute might well count as a low risk psychoactive, but remain tightly regulated (perhaps banned altogether) so long as it has not moved on the other salient axes (such as moving towards being a medicinal drug, or towards social acceptance). This approach would allow the substance to be studied socially and ethically in an interesting way, for instance by focussing attention on the various social processes involved in moving a technology along the different axes of regulation. A good example might be Ritalin: this medicine has both official and unofficial uses, the unofficial uses attracting the full regulatory might of ministries of the interior to control illicit amphetamine use, the official uses attracting the soft forces of parental and teacher approval for its use and the harder forces of official approval for stricter control of errant children's behaviour (thus making taking Ritalin more attractive).⁹³

Another good example of proposals to regulate a neurotechnology concerns the extensive debate over the possible use of neural imaging as a form of forensic evidence.⁹⁴ One regulatory question would concern the technical standards governing its admissibility on the basis of reliability, sensitivity, specificity and so on. Another would concern the admissibility of such evidence on procedural grounds – for example, should neural images obtained for some other purpose (say in clinical diagnosis) be used in criminal or other court proceedings? Could images obtained under duress or compulsion be admissible? Another would concern the admissibility of such evidence in different stages of the judicial process: data which is not admissible in fixing whether or not the accused committed the offence charged might yet be admissible in the part of the hearing concerned with sentencing, for example. Finally, there is the more general sociolegal family of questions concerning the production of particular images or concepts of crime and criminal responsibility, and the production of social responses to the perceived (or actual) risks of crime which would motivate making compulsory or quasi-compulsory uses of imaging more or less attractive. Acceptance of imaging in court proceedings would not necessarily make acceptance of imaging as a form of preventive screening to exclude people from certain

⁹³ Cooper P. Education in the age of Ritalin. In Rees D, Rose SPR (eds.) *The New Brain Sciences: Perils and Prospects* Cambridge: Cambridge University Press, 2004: ch.16

⁹⁴ Equally, one could discuss the parallel debate concerning the use of behavioural genetic evidence in the courts. See Garland B (ed.) *Neuroscience and the Law: Brain, Mind and the Scales of Justice* New York: Dana Foundation, 2004; Sedley S. Responsibility and the law in Rees D, Rose SPR (eds.) *The New Brain Sciences: Perils and Prospects* Cambridge: Cambridge University Press, 2004: ch.7; Nuffield Council on Bioethics *Genetics and Human Behaviour: the Ethical Context* London: Nuffield Council on Bioethics, 2002

occupations where criminal behaviour of a given kind is disastrous. Suppose a certain part of the brain has a characteristic appearance under fMRI scanning in people with some particular disposition to paedophile behaviour. It would be easily imaginable that scanning potential teachers for the presence of this kind of image as a predictor of their potential for paedophile behaviour could be rather popular; and equally that the presence of this image would not be regarded as exculpatory in criminal trials for paedophile assaults.

This sort of example underscores both that the question of regulation and neurotechnologies involves both the analysis of regulation of the uses of those technologies, and the use of those technologies in regulation of other behaviours. Another example might be the use of drugs to compel truthfulness under interrogation. Some commentators have tried to define a concept of “cognitive liberty” or “cognitive privacy” which is a fundamental human right.⁹⁵ Others have focussed instead on the moral requirement to be truthful, and might argue that forcing someone to tell the truth denies their specifically moral obligation to tell the truth. This sort of concern is more like a dignity concern than a rights concern.⁹⁶

6.3 Approaches to Regulation and Neurotechnologies

There are a number of different issues that would bear fruitful examination:

- The institutions of regulation. Medical practices and technologies are regulated by many different kinds of institution, from local Research Ethics Committees, to the courts and the General Medical Council, the Royal Colleges and the Medicines and Healthcare Regulatory Authority. Specific devices may be regulated in terms of quality and safety by licenses, standards, codes of practice, training programmes, and institutions from clubs to government departments. An important regulatory device is price (including price modification through taxation or license fees).
- The functions of regulation. Regulation may focus on safety, quality, restriction of access to a specific class of users, encouragement of good practice or discouragement of abuse or misuse, and so on. It may also focus on trying to produce and control a specific type of use at the expense of other uses. Hence, Ritalin use to encourage concentration and scholastic performance is encouraged; Ritalin use as a form of recreational amphetamine is discouraged. This may potentially model other drugs with a fuzzy treatment/enhancement profile.
- The impacts of regulation. These can be both desired and expected, desired and unexpected, undesired but expected, and undesired and unexpected. And of course we can always ask (un)desired or (un)expected by whom (users, regulators, society at large, different sections of society...) Some of these impacts will be qualitative in character (such as invasions or enhancements of personal privacy), and may be considered in terms of wrongs (a deontological category), whereas others may be quantitative in character (such as a degree of pain or suffering or inconvenience), and may be considered in terms of harms (a consequential category). Conversely, benefit assessment will have a similar structure.
- The subjects of regulation. Who is regulated, and who is affected by such regulation. In considerations of the distributive justice of regulation, that a particular distribution of

⁹⁵ Centre for Cognitive Liberty and Ethics <http://www.cognitiveliberty.org/>

⁹⁶ It is a Kantian thought, in effect. On this line of thinking, one cannot compel someone to be good – they can only be good if they freely choose to be good. What this means in a neuroscientifically informed psychology is quite difficult to discern, but Casebeer has made an interesting attempt: Casebeer WD *Natural Ethical Facts: Evolution, Connectionism, and Moral Cognition* Cambridge, Mass.: MIT Press, 2003

benefits and harms pursuant to regulation is significantly different to the distributions of benefits and harms pursuant to the unregulated, or otherwise regulated, use of the technology being governed is highly relevant, although sometimes neglected.

- The principles of regulation. Many regulatory practices are undersigned, and many that are designed are designed with no specific moral or social principles of regulation in mind. In genethics, as ELSI issues have become more and more prominent, there seems to be a preference for prioritising autonomy-based principles of regulation, so far as patient choice goes, at least. Will these principles transfer to neuroscience? This is an especially pertinent question given the ways in which neuroscience seems to require a reframing of the very idea of autonomy.
- Styles of regulation. Although as noted there are many different institutional forms of regulation, we can also pay attention to the ways these implement or favour different styles of regulation – centralist or democratic, formal or informal, egalitarian or libertarian in respect of distributive justice, libertarian or communitarian in respect of criminal justice, and so on.

6.4 Key Questions

- What styles of regulation would be appropriate for enhancement technologies? Would adapting the types of regulation currently in place for steroids in athletics or the recreational use of psychoactive drugs be effective or desirable if applied to cognitive enhancers, for example?
- How is the treatment/enhancement distinction actually constructed in different settings? What moral force do people see it as having?
- How might neural imaging techniques be used in the labour market? What social and economic impacts would this have?
- How might using neural imaging to “type” personalities affect our concept of equality of opportunity or equality of respect between individuals?

7. Conclusion

This review has necessarily been an impressionistic and somewhat personal review of the very fast changing and still immature field of neuroethics. The first programmatic papers were published only in 2002, and the field is still dominated by review articles. The review articles tend to be interpretive reviews of the current science, explaining why ethicists, social scientists, policy makers and others should take an interest in the developments in the neurosciences. Yet from a historical point of view, this is a curiously foreshortened image of the scope of the field; the rich debates on the ethics and philosophy of psychiatry, brain death and other controversies in neurology, and the sophisticated philosophical anthropology produced in the name of “romantic science” by AR Luria, Kurt Goldstein and others remain important resources not only for ethicists and social scientists but for neuroscientists themselves.

We have tended to dwell on controversy and personal and social risks. This is not essentially because we think that the neurosciences are just a bag of trouble for society – the potential for better treatments, a deeper understanding of human nature and human possibilities, and social and economic progress is as present in the neurosciences as it is in genetics and biomedicine generally. But from the point of view of trying to scope out what the “ethical issues” and policy challenges may be, it is better to be cautious and to try to be clear about the negative impacts and social challenges. From the point of view of neuroscientists and many social scientists this is inevitably a biased perspective: it is clear that a social science take on the neurosciences will be more descriptive and explanatory than normative. Even within this perspective, however, a social science understanding of the neurosciences and their applications will need to focus as much on what people say and think about these technologies as what is done with them.⁹⁷

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⁹⁷ In addition to the works cited in this report, readers might usefully consult the following, which came to our attention after this report was completed: Dumit J *Picturing Personhood: Brain Scans and Biomedical Identity* Princeton, NJ: Princeton University Press, 2004; Illes J (ed.) *Neuroethics: Defining the Issues in Theory, Practice, and Policy* New York: Oxford University Press, 2005; Kircher T, David A (eds.) *The Self in Neuroscience and Psychiatry* Cambridge: Cambridge University Press, 2003; Radden J (ed.) *The Philosophy of Psychiatry* Oxford: Oxford University Press, 2005; Shamoo AE (ed.) *Ethics in Neurobiological Research with Human Subjects: The Baltimore Conference on Ethics* Amsterdam: Gordon and Breach, 1997; Bush SS (ed.) *A Casebook of Ethical Challenges in Neuropsychology* London: Taylor and Francis, 2005; Bernat JL *Ethical Issues in Neurology* Boston, MA: Butterworth-Heinemann, 2002 (2nd ed.); Zeman A, Emanuel L (eds.) *Ethical Dilemmas in Neurology* London: WB Saunders, 2000; May L, Friedman M, Clark A (eds.) *Mind and Morals: Essays on Ethics and Cognitive Science* Cambridge, MA: MIT Press, 1998; Goldman AI *Philosophical Applications of Cognitive Science* Boulder, CO: Westview Press, 1993; Baron-Cohen S *The Essential Difference* London: Penguin, 2003; Blakemore S-J, Frith U *The Learning Brain: Lessons for Education* Oxford: Blackwell, 2005; Bentall RP *Madness Explained: Psychosis and Human Nature* London: Penguin, 2003; Fulford KWM, Morris K, Sadler JZ, Stanghellini G (eds.) *Nature and Narrative: An Introduction to the New Philosophy of Psychiatry* Oxford: Oxford University Press, 2003; Illes J, Blakemore C, Hansson MG, Hensch TK, Leshner A, Maestre G, Magistretti P, Quirion R, Strata P International perspectives on engaging the public in neuroethics *Nature Reviews Neuroscience* 2005; 6: 977-982