### Advanced Medical Technology and the Brain Questions on Personhood, Patient Autonomy and Patient Rights

Dr. Derrick Au CUHK Centre for Bioethics

4th Bioethics Journal Club meeting (21.9.2017)

# Bioethics – taking a broad view

- Studies the ways in which decisions in medicine and science touch upon our health and lives and upon our society and environment.
- A branch of Applied Ethics often requiring contribution from multiple disciplines including law, philosophy, theology, medicine, the life sciences, nursing and social science.
- Values at stake: human life, the dignity of the frail and elderly, just healthcare, bodily integrity and the ability to make reasonable decisions.



Adelaide Centre for Bioethics and Culture

http://www.bioethics.org.au/Resources/Bioethical%20Issues.html

# About the Journal Club

- Topics of interest bringing people from different disciplines and affiliations together
- Share thoughts in some depths
- Evolve streams of ongoing discussions
- Previous meetings:
  - Proxy decisions and respecting autonomy of elder patients
  - Medical dissensus and pluralism for end of life care
  - Moral distress in nursing
  - This one...considering ethical challenges from advanced medical technologies in neuro-interventions

711

TRENDS in Cognitive Sciences Vol.9 No.1 January 2005

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# Neuroethics: the practical and the philosophical

### Martha J. Farah

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In comparison with the ethical issues surrounding molecular genetics, there has been little public awareness of the ethical implications of neuroscience. Yet recent progress in cognitive neuroscience raises a host of ethical issues of at least comparable importance. Some are of a practical nature, concerning the applications of neurotechnology and their likely implications for individuals and society. Others are more philosophical, concerning the way we think about ourselves as persons, moral agents and spiritual beings. This article reviews key examples of each type of issue, including the relevant advances in science and technology and their accompanying social and philosophical problems.

### Introduction

Almost three decades ago, in the picturesque coastal retreat of Asilomar, California, a group of molecular biologists gathered to discuss the safety of the newly developed recombinant DNA technology. In the years since, concern about the risks of genetic engineering have remained prominent in the public consciousness, as well as commanding the attention of academic bioethicists, government regulators, and biologists themselves. At the start of the 21st century, neuroscience has developed to a point where it, too, may have profound effects on society, extending far beyond the research laboratory or medical clinic.

Like the field of genetics, neuroscience concerns the biological foundations of who we are, of our essence. The relation of self to brain is, if anything, more direct than that of self to genome. Perhaps more important, neural interventions are generally more easily accomplished than genetic interventions. Yet until recently there has been little awareness of the ethical issues arising from neuroscience. Beginning in 2002, neuroscientists began to address these issues in the scientific literature (eg. [1-5]) and the field gained a name, 'neuroethics' [6].

Neuroethics encompasses a large and varied set of issues, and initial discussions focused on various different subsets of those issues. Some neuroethical issues concern the practical implications of neurotechnology for individuals and society. Technological progress is making it possible to monitor and manipulate the human mind with ever more precision through a variety of neuroimaging methods and interventions. For the first time it may be possible to breach the privacy of the human mind, and judge people not only by their actions, but also by their

Corresponding author: Farah, M.J. (mfarah@psych.uponn.odu) Arailable online 13 December 2004 thoughts and predilections. The alteration of brain function in normal humans, with the goal of enhancing psychological function, is increasingly feasible and indeed increasingly practiced. At the same time, progress in basic neuroscience is illuminating the relation between mind and brain, a topic of great philosophical importance. Our understanding of why people behave as they do is closely bound up with the content our laws, social mores, and religious beliefs. Neuroscience is providing us with increasingly comprehensive explanations of human behavior in purely material terms. Although the field of neuroethics is young and still evolving rapidly, the time seems ripe for a review in which the key issues of neuroethics, both practical and philosophical, are surveyed and placed in relation to one another.

### Brain imaging and brain privacy

Among the neuroscience technologies that present new ethical challenges of a practical nature is functional brain imaging. This includes the familiar false-color images of positron emission tomography (PET) and functional magnetic resonance imaging (fMRI), as well as the electroencephalography-derived methods of event-related potentials (ERPs) and magnetoencephalography (MEG) and optical imaging methods such as near infrared spectroscopy (NIRS). These methods vary in their invasiveness and portability, which constrain the uses to which they can be put, although any one of them can be used to obtain personal information surreptitiously, in a study ostensibly designed for a different purpose. In principle, and increasingly in practice, imaging can be used to infer people's psychological states and traits [13.7].

For example, in 'neuromarketing' brain imaging is used to measure limbic system response to a product that may indicate consumers' desire for it. In one recent demonstration, brain activity related to soft drink preference was sensitive to both the taste of the drink and to the brand name, with Coke<sup>10</sup> evoking more activity than Peps<sup>100</sup> only when subjects knew which brand they were tasting [8]. To the extent that neuroimaging can measure unconscious motivation to buy, it provides a valuable new kind of information for marketers.

Another potential use for functional imaging of brain states is lie detection. Although fMRI-based lie detection is far from feasible in real-world situations, researchers have found correlates of deception in the laboratory [9]. ERPs come closer to providing actual brain-based lie detection. They have been used to identify 'guilty knowledge' by

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### Ethical issues from advanced technology (1): First genetic engineering, then neural interventions

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- "Neuroethics" a term first coined in 2002.
- Like genetics, concerns the foundations of who we are, "our essence".
- Some new ethical issues are not clinical: (1) brain imaging and 'brain privacy' – monitoring the human mind; (2) enhancing psychological functions – manipulating the human mind

### Ethical issues from advanced technology (2): First genetic engineering, then neural interventions

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- Non-pharmaceutical Methods for altering brain functions rapidly moving from laboratory to clinical: transcranial magnetic stimulation (TMS), surgery, brain stimulation, brain-machine interfaces
- Philosophical our conception of human nature, and 'human soul'; moral responsibility and 'blaming on the brain'; neuroscience edging out intuitive or religious views of persons.

### Journal of Closical Neuroscience 21 (2014) 1-5



### Review

### Ethical considerations in deep brain stimulation for psychiatric illness

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### Ryan A. Grant \*\*, Casey H. Halpern<sup>b</sup>, Gordon H. Baltuch<sup>b</sup>, John P. O'Reardon<sup>c</sup>, Arthur Caplan<sup>d</sup>

\*Department of Neurosupper, Yoli, New Hauen Medical Center, 60 Dengler, Street, New Hauen, CT 005 13, USA 10 Opportune of Neurosupper, Nationarian of Neurosuphania Modulal Center, Poliadophia, BK, USA \*Department of Psychiatry, University of Neuroise and Denative of Neuro-Jenery, Stredford, NJ, USA \*Dussion of Revolutions, Neuroise Visionaria, Neuro Yosh Claus VI, Visionaria, Neuro-Jenery, Stredford, NJ, USA \*Dussion of Revolutions, Neuroise Visionaria, Neuro Yosh Clau, NY, USA

ABSTRACT

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### ARTICLE INFO

Article history: Received 31 October 2012 Accepted 6 April 2013

Jeyneands: Deepe bua in stimulation Depression Ethics Mood OCD Psychiatric Deep brain stimulation (DBS) is an efficicious surgical treatment for many conditions, including obsersive-compulsive disorder and treatment-resistant depression. DBS provides a unique oppertunity to not only antehoater disease but also to study mood, cognition, and behavioral effects in the brain. However, there are many ethical questions that must be fully addressed in designing clinical research trials. It is crucial to maturities sound ethical boundaries in this new era so as to permit the proper testing of the potential therapeutic role DBS may play in ameliorating these devantating and frequently treatmentrefractory psychiater disorders. In this review, we can use the effect of the properties for target, informed comment, clinical trial design, DBS in the prediatix population, concern about intentionally or inadverterity Attenting an addividual's personal desirity, potential use of DBS for brain enhancement, direct moddiraction (psychivor through neuromodulation, neuronal alexation).

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### 1. Introduction

Deep brain stimulation (DBS) is an efficacious surgical treatment for many conditions.1-3 It involves the implantation of electrodes into a particular region of the brain implicated in the pathophysiology of a neurologic or psychiatric disorder. Unlike its precursor ablative procedures, DBS has the benefit of being less destructive, reversible, and titratable to a patient's symptoms. DRS was approved by the US Food and Drug Administration (FDA) in 2001 for advanced Parkinson's disease (PD) and in 1997 for essential tremor (ET), and given its success in controlling many motor features of these conditions,4 the application of DBS was extended to dystonia. More recently, there has been immense interest in the potential application of DBS to psychiatric disorders. For example, there are ongoing multi-institutional, randomized sham-controlled clinical trials of DBS of the ventral capsule/ventral striatum and subgenual cingulate (VC/VS) for treatment-resistant depression.5.6 The VS, and particularly the nucleus accumbens, has been shown to respond abnormally to pleasurable stimuli in patients suffering from severe depression.7 Using DBS in this region provided a 42% improvement in depression severity.<sup>8</sup> Similarly, patients who re-ceived DBS to the subcallosal cingulate gyrus<sup>31,33</sup> had an average response rate of 64.3%.11

Functional neuroimaging has implicated certain brain regions in the pathogenesis of treatment-resistant obsessive-compulsive dis-

E-mail address: ryan grant@yale edu (RA Grant).

0067-5463/\$ - see front matter © 2013 Published by Elsevier Ltd. http://dx.doi.org/10.1016/jjocn.2013.04.004 order (OCD) and depression (TRD), with DBS demonstrating promise in both of these psychiatric disorders. A pilor study of DBS of VC(VS in 10 OCD patients, with long-term follow-up, reported a 363 decrease in disease severity and nearly a 50% improvement in global functioning.<sup>10</sup> This region of the brain has been consistently implicated in OCD,<sup>21-54</sup> which is not surprising given its central position between the amygdala. basid gangla, thalamus, and prefrontal cortex – all regions known to be involved in this diorder.<sup>73,10</sup>

Despite these promising findings, some experts question whether there is currently enough preliminary evidence to warrard large-scale clinical trials. In a Contensus Conference examining the scientific and ethical issues in the application of DBS to affective disorders, some maintained that it is "premature to design largescale randomized controlled trials of DBS for [affective disorders] before optimal targets and electrode settings have been determined in small, early-phase studies".<sup>17</sup> Nevertheless, positive autcomes from some pilot studies have led to the initiation of larger, andomized-controlled trials of DBS for mod disorders, which show encouraging results or are without adverse events for both depression and OCD.<sup>18-20</sup> The recent limited FDA approval, a HumanitarianDevice Exemption, of DB 50 oCD<sup>27</sup> provides further support for the future of hroader testing of the feasibility, safety, and efficacy of DBS for neuropsychiatric conditions.

The explosion of new technology in the modern era has contributed to the birth of the subspecialty in bioethics known as neuroethics. This field encompasses the professional and procedural ethics of conducting neuroscience research, the manner in which

<sup>\*</sup> Corresponding author. Tel: +1 248 761 4683.

# Deep Brain Stimulation (DBS) for Psychiatric Illness (1)

- Implants electrodes to specific region of the brain implicated in the pathophysiology. Approved by FDA in 2001 for advanced Parkinson's Disease. Moved on to investigational treatment of resistant depression as. Early trials Is to treat OCD.
- Research ethics: Protection of vulnerable research subjects and aftercare. Risk of abuse. Informed consent is a real challenge. Sham surgery as control is another issue.

	Contents lists available	at SciVerse ScienceDirect		
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ELSEVIER	journal homepage: www.elsevier.com/locate/jocn			
Review				
Ethical consider	ations in deep brain stim	ulation for psychiatric illness		
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# Deep Brain Stimulation (DBS) for Psychiatric Illness (2)

Identity and personhood issues:

- Self-adjusting or switching 'on'/'off' of pulse generators?
- How much change in established personality is acceptable?

Adverse effects on memory?



### Psychosurgery and Neuroimplantation: Changing What is Deep Within a Person

GRANT GILLETT

Psychosurgery and searoimplantation are two overlapping sets of procedures both aimed at 'the source of our plansure, merriment, heighter and semantenest, as of our grief, pain, nutriety and tears' (Hippocrates, 1973). Some of the techniques involved have demonstrained and relatively objective results but some do not; some have well-attablished indications and measures of success but others are constructed, all that the exclosures of the new and appeal to both theorists and therapists. Such is the current internal is the interconnections between neuroscience and others that the term 'neuroscibic' has been opiced to cover the innervative scadensic (and not-so-academic) writing in this area (lournal of Medical Ethics).

The othical aspects of interventions in the staff of mind are best considered against a philosophical understanding of the mind or axol in entation to the brain. I will explore an Aristoschian understanding of that whation (1986) because it reoders the mind/brain relation comprohensible and accessible to detailed discussion. It therefore allows a perceptive pervises of the implications of mind/brain for psychoargery, neural repair and searal exhancement with cybernetic technology in relation to issues of both well-being and identity.

### ARISTOTLE ON THE SOUL

The Aristotellan seel is part of a holistic conception of human beings in which both matter and subjectivity are important (as it is for thinkers from St Themas Aquinas to present day naturalistic philosophers). A helpful analogy is the form of a statuse - ray a statuse of Diana - that exists as such in virtue of a particular configuration of a piece of broose. The same bronze, recast inso tinctive nature, properties and significance. The form of a living human being is, however, not just an immimate shape but also a holisite, subjective and embedied realily underginning all our thinking in biomedical ethics (Gittett, 2004, pp. 6–7). Aristetle's view conceives of human beings as social

a statue of Apollo, becomes a different thing with a dip-

animals who exhibit reason and reflection (Arisaotle, 1925; Bannes, 1982): 'If the eye was an animal, then sight would be its soul" (Aristocle, 1986 p. 158). The human soul "is defined by ... the sutritive, perceptive, and intellective faculties and stoveneon" (Aristotle, 1986 p. 160) of an integrated being, Our bureas masse and social function (or relatedness) result in an identity which evolves over time, a stream of conscious experience, and a moral standing as a socially situated agent whose Life-story is lived among other human beings. A formative part of this life-story relates to caregivors in the context of intense interpersonal activity in which we are loved by and learn to love other people. The human soul, we might say, comprises as emergent set of functions reflecting the interrelatedness of reason, emotion and action in human life. Thes (after Witgenstein, Bruner, Harre and others) an exclusive focus on 'intellective' functions in human nature overlooks the complexity of our function as members of a collecsive group bound to each other in familisl and cultural ways.

Our brains, as the Hippocratics needs, relate us to a natural and human environment and also to formative collecul symbols and myths so that the isols of cognitive adaptation are holissically informed by the interaction with the world and others. For this reason the relatively rich term 'mood' is preferable to the term 'mind' in discussing the human pyche as it engages with psychiatry and human dysfanctio (Gillers, 1999).

Principles of Haulth Care Dirics. Second Edition Edited by R.E. Adversit, A. Dawson, H. Dosper and J.R. Mold-Itan @ 2020 Autor Wiley & Saws, Ltd

## Philosophy of the Mind (or Soul) (1)

- Aristotle: The Human Soul defined by human reason and human relatedness.
- The bitter experience from 'the lobotomy years' - curing a disorder or transforming a person to someone who is more acceptable to the rest of us?
- Evaluation of objective good and patient's subjective wish not easy – relevant assessment is affected by the evaluative and observer-dependent nature of the judgments.
- Embryonic tissue transplant has been a hot topic

	109
Psychosurgery	and Neuroimplantation:
Changing What	is Deep Within a Person

sets of procedures both aimed at 'the source of our pleasure, merriment, laughter and unsutement, as of our grief, in, anxiety and tears' (Hippocrates, 1978). Some of the echniques involved have demonstrable and relatively obetive results but some do not; some have well-estab-shed indications and measures of statests but others are conversial; all share the encirconest of the new and ap-peal to both theorists and therapists. Such is the current nust in the interconnections between neuroscience ind othics that the term 'neuroethics' has been opined to cover the innevative scademic (and not-so-academic) citing in this area (Journal of Medical Ethics).

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a statue of Apollo, becomes a different thing with a dis a historio di Aplanto escolare a distorrenti titing with a cre-tificitive nature, properties and significance. The form of a living human being is, however, no just an inzilirate shape but also a holisite, sabjective and embedied reatity underpinning all our thinking in biomedical ethic (Giltett, 2004, pp. 6-7).

(Grinnell, 2006, pp. 6–1). Aristotie's view conceives of itemas beings as social animals who exhibit remon and erflection (Aristotle, 1925). Burnes, 1982): 'if the eye was an animal, then eight would be its soul" (Aristoile, 1986 p. 158). The human scul "is defined by ... the metricive, perceptive, and intellective faculties and movement" (Aristotle, 1986 p. 160) of an integrated being. Our business images and accial functions (or retaindness result in an identity which evolves over time, a stream of conscious experience, and a moral standleg as a socially situated agent whose life-story is lived among other human beings. A formative part of this life-story relates to caregive ers in the context of intense interpersonal activity in which we are loved by and learn to love other people. The human soul, we might say, comprises an energont set of functions reflecting the intervelatedness of reason, emotion and action in human life. Thus (after Wittgematein, Bruner, Marre and others) an exclusive focus on 'intellective' functions in human nature overlooks the complexity of our function as members of a collective group bound to each other in family isl and cultural ways Our brains, as the Hippocratics need, relate us to a matu

ral and human environment and also to formative cult in some sense with the sense of the sense of the sense of the sense are holistically informed by the instructions with the world and ethers. For this reason the relatively rich term 'soul' is preferable to the term 'mind' in discussing the human psyche as it engages with psychiatry and burnan dysfung-tion (Giller, 1999).

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## Philosophy of the Mind (or Soul) (2)

- Clinical ethics issues: Pressure to use experimental treatments. Long term complications may be unknown.
- Cyborgs: part-human and partmachine complexes developing fast.
- "The technologies of the psyche are deeply problematic in that they straddle a deep-seated ideological divide."
- "Don't play with what lies deep in another person."(Wittgenstein, 1980)

	109
Psychosurgery ar	d Neuroimplantation:
Changing What is	Deep Within a Person

Psychosopary sod secricopamatics are two overlipping wind gracedwards bud aised with two sources of our prior, prior prior the source of the source of the prior wares, the source of the source bud others are conversely and the source of the source bud others are conversely at the source of the source bud others are conversely at the source of the source bud others are conversely at the source of the source bud others are conversely at the source of the source bud others are conversely at the source of the source bud others are conversely at the source of the source bud others are conversely at the source of the source bud others are conversely at the source of t

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### ARISTOTLE ON THE SOUL

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Aristotle's view conceives of human mimals who exhibit reason and reflection (Aristotle, 1925; Barnes, 1982): 'if the eye was an animal, then sight would be its soul" (Aristosle, 1986 p. 158). The human soul "is defined by ... the sutritive, perceptive, and inteflective faculties and rement" (Aristotle, 1986 p. 160) of an integrated being Our bureas reason and accial function (or relatedue result in an identity which evolves over time, a stream of tenscious experience, and a succel standing as a socially sinused agent whose life-story is lived among other har ings. A formative part of this life-atory relates to caregiv ers in the context of intense interpersonal activity in which we are loved by and learn to love other people. The human and two period by some reach to need to rear peopler. Into Human social, we might any, competition and semigrout set of functional reflecting the interrelatedness of reason, emotion and ac-tion in human life. Thus (after Wittgenstein, Bruner, Maere and others) an exclusive focus on 'amellective' functions in human nature overlooks the complexity of our function as members of a collective group bound to each other in familisl and cultural ways.

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Principles of Baulti-Care Ditus, Second Edition Edited by R.E. Ashersh, A. Dawson, H. Doper and J.R. Millellum B 2007 July Wiley & Son, Lid

### Thank you for your attention

