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A four-part working bibliography of neuroethics: part 2 – neuroscientific studies of morality and ethics

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Abstract

Background: Moral philosophy and psychology have sought to define the nature of right and wrong, and good and evil. The industrial turn of the twentieth century fostered increasingly technological approaches that conjoined philosophy to psychology, and psychology to the natural sciences. Thus, moral philosophy and psychology became ever more vested to investigations of the anatomic structures and physiologic processes involved in cognition, emotion and behavior - ultimately falling under the rubric of the neurosciences. Since 2002, neuroscientific studies of moral thought, emotions and behaviors have become known as – and a part of – the relatively new discipline of neuroethics. Herein we present Part 2 of a bibliography of neuroethics from 2002–2013 addressing the "neuroscience of ethics" – studies of putative neural substrates and mechanisms involved in cognitive, emotional and behavioral processes of morality and ethics.

Methods: A systematic survey of the neuroethics literature was undertaken. Bibliographic searches were performed by accessing 11 databases, 8 literature depositories, and 4 individual journal searches, and employed indexing language for National Library of Medicine (NLM) Medical Subject Heading databases. All bibliographic searches were conducted using the *RefWorks* citation management program.

Results: This bibliography lists 397 articles, 65 books, and 52 book chapters that present (1) empirical/experimental studies, overviews, and reviews of neural substrates and mechanisms involved in morality and ethics, and/or (2) reflections upon such studies and their implications. These works present resources offering iterative descriptions, definitions and criticisms of neural processes involved in moral cognition and behaviors, and also provide a historical view of this field, and insights to its developing canon.

Keywords: Neuroethics, Neuroscience, Morality, Moral Psychology, Ethics, Bibliography

Introduction and background

Throughout much of recorded history, humans have sought to define the nature of right and wrong, and good and evil. Since antiquity, such questions have been the focus of moral philosophy. However, empirical and experimental movements of the late nineteenth century drew scientific attention to philosophical questions, and the queries of moral philosophy became the focus of the then nascent discipline of psychology. The industrial turn of the twentieth century fostered increasingly technological approaches that conjoined psychology to the natural sciences. Philosophical speculation, and psychological observation and experimentation became ever more rooted in, and vested to investigations of the anatomic structures and physiologic processes involved in cognition, emotion and behavior. Thus, studies of moral philosophy and moral psychology became the province of brain research, ultimately falling under the rubric of the neurosciences, which became firmly established as a titular field in the middle-to-late 1970s [1]. Important contributory literature from the 1960s through early 2000s is provided below.

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Important contributory literature from the 1960s through early 2000s

Journal Articles

Allison T: **Neuroscience and morality.** *Neuroscientist* 2001, **7**(5):360-364.
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Books

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Luria AR: *The Man with a Shattered World: The History of a Brain Wound*. New York: Basic Books 1972.
Minsky M: *The Society of Mind*. New York: Simon and Schuster 1986.
Nagel T: *Equality and Partiality.* Oxford and New York: Oxford University Press 1991.
Pylyshyn ZW: *Computation and Cognition: Toward a Foundation for Cognitive Science*. Cambridge, Mass.: MIT Press 1984.
Rolls ET: *The Brain and Emotion.* Oxford: Oxford University Press 1999.
Taylor C: *Sources of the Self: The Making of Modern Identity.* Cambridge, Mass.: Harvard University Press 1989.

Since 2002, neuroscientific studies of moral thought, emotions and behaviors have become known as – and a part of – the relatively new discipline of neuroethics [2]. As a field, neuroethics' focus is not limited to studies of neural bases of morality, but also centers upon those ethical issues that are fostered by neuroscientific research and its various implications and applications in clinical medicine and the public sphere. Thus, as the tools and techniques of neuroscience become more sophisticated and precise, the questions raised by neuroscience and neuroethics may be equally, or even more pressing as those answered [3]. How can –and will–the brain sciences inform concepts of morality, ethics and law? Will understanding the structure and functions of brain networks and processes involved in social interactions, emotions and behaviors alter constructs of "free will," culpability, and responsibility? Can neuroscientific information provide a basis for guiding how we should behave, either as individuals or as actors-in-community? Will the brain sciences foster a "new ethics" of neuroethics,

and if so, how might these new ideas–and perhaps ideals–comport with long held traditions and norms of morality and ethics on an ever more pluralistic world stage?

The late William Safire concluded his introductory remarks to the 2002 Dana Foundation conference "Neuroethics –Mapping the Field" by congratulating the attendees for tackling "…the challenge of carving out a new territory for an old philosophical discipline" [4] by examining the neural mechanisms of morality. The following bibliography reflects this challenging "new territory", as presented in published works from 2002–2013. These works are experimental, empirical, and/or hypothetical. In some cases the position is inquisitive, in others speculative, and in others a critical perspective is taken (of approaches used to exemplify and study ethical dilemmas, of the prior and current descriptions of psychological processes of human relations, and of concepts of morality and ethics, more generally).

Methods

Methods for systematically searching relevant literature devoted to neuroethics are identical to those utilized in Part 1 of this bibliography [5]. Search strategies utilizing MeSH (Medical Subject Headings: http://www.ncbi.nlm.nih.gov/mesh/) indexing terms were used for generating bibliographies from PubMed and National Library of Medicine (NLM) Catalog. MeSH includes ethics-related terms developed for BIOETHICSLINE, a specialty database devoted to bioethical issues produced for NLM by the Kennedy Institute of Ethics from 1975–2000. Other databases were searched using descriptors specific to those databases. The searches were limited to work published from 2002 to 2013.

The following databases were searched to produce this bibliography:

1) PubMed (http://pubmed.gov):
   Search Strategy: (morals[majr:noexp] AND (neurosciences/ethics[majr:noexp] OR cognitive science/ethics[majr] OR brain[majr:noexp]))
2) The NLM Catalog (http://www.ncbi.nlm.nih.gov/nlmcatalog):
   Search Strategy: (morals [majr:noexp] AND (neurosciences/ethics[majr:noexp] OR cognitive science/ethics[majr] OR brain[majr:noexp]))
3) Academic Search Premier:
   Search Strategy: TX morality AND SU neurosciences AND SU philosophy
4) Proquest Research Library:
   Search Strategy: su (morality) AND su (neurosciences)
5) JSTOR:
   Search Strategy: ab:(moral) AND ab:(neuroscience)
6) WorldCat (http://www.worldcat.org).:
   Search Strategy: "cognitive neuroscience" and "moral and ethical aspects" (as subject phrases)
7) Philosopher's Index:
   Search Strategy: su(moral) AND su(neuroscience)
8) Embase:
   Search Strategy: neuroscience:de AND morality:de
9) BELIT (http://www.drze.de/belit/).:
   Search Strategy: neurosciences* [subject keywords] and morality*[subject keywords]
10) Web of Knowledge/Web of Science (WoS):
    Search Strategy: [topic] morality neurosciences
11) Digital Public Library of America (DPLA) (http://dp.la/):
    Search Strategy: brain moral
12) Directory of Open Access Journals (DOAJ) (http://www.doaj.org/):
    Search Strategy: [search all] moral neurosciences
13) Hathi Trust Digital Library (http://www.hathitrust.org/):
    [any of these words] morality moral in Subject AND [any of these words] neurosciences brain cognitive in Subject
14) European Library (http://www.theeuropeanlibrary.org/tel4/):
    Search Strategy: [subject] moral AND [subject] brain
15) Internet Archive (http://archive.org/):
    Search Strategy: morality AND brain
16) Globethics.net (http://www.globethics.net/):
    Search Strategy: [keywords] moral AND neurosciences
17) Neuroethics-Wikiography (https://teamweb.uni-mainz.de/fb05/Neuroethics):
    Search Strategy: moral

As previously noted [5], open access bioethics' journals not contained in the Directory of Open Access Journals (DOAJ) were individually accessed and searched; these included:

1) *Journal of Ethics and Social Philosophy* from the University of Southern California http://www.jesp.org/);
2) *Journal of Mental Health Ethics* from McMaster University (http://www.jemh.ca/);
3) *Journal of Practical Ethics* (http://www.jpe.ox.ac.uk/) from the Oxford Uehiro Centre for Practical Ethics at the University of Oxford; and
4) *Philosophers' Imprint* from the University of Michigan (http://www.philosophersimprint.org/).

As in Part 1 of this bibliography [5], the *RefWorks* citation manager program was utilized to eliminate duplicate reference citations.

Results

The following reference citations provide a listing of 397 articles, 65 books, and 52 book chapters that afford (1)

empirical/experimental studies, overviews, and reviews of neural substrates and mechanisms involved in morality and ethics, and/or (2) reflections upon such studies and their implications.

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Discussion and conclusions

Despite our best efforts to amass as complete a bibliography of the past 10 years' neuroethics literature as possible, automated indexing and other technical issues can affect the retrieval of documents. However, this need not constrain the capability of this document to provide a valuable nexus in, and for the discipline. As consistent with Part 1 of this series, we conceive of this bibliography as a participatory endeavor, and request that the readership contribute to this effort by adding any missing citations to the online comments section of this bibliography. Citations also can be emailed directly to the bibliographic manager at: **bioethics@georgetown.edu** for subsequent inclusion as commentary/addenda to this work.

To be sure, with advances in neuroscientific capabilities and expanding use of neuroscientific techniques and technologies in medicine, arguments are being made to address ethical issues generated by brain research [6], prompting elaboration of neuroethics as the "ethics of neuroscience" [2,7]. Indeed, it is (perhaps most) important to ask if such approaches to studying (moral) cognition and actions are technically apt, valid, and therefore of any real value [3,8]. Will necessary review, oversight and guidance be developed to direct and regulate if and how such research should or should not be conducted and translated into clinical treatments? Might studies of the putative neural bases of moral thought and action establish trends to engage these substrates and mechanisms in the clinical practices of neurology and psychiatry, and/or establish a basis for boutique, socially-, legally-, or politically-oriented interventions aimed at altering moral cognition and behaviors? Part 3 of this series will present a current bibliography of these and other neuroethical issues germane to clinical medicine.

In addition to implications for clinical care, neuroscientific studies of cognition, emotion and behavior can be – and are increasingly – leveraged in legal and social contexts, which must be considered on an international scale [9,10]. How, for example, might neuroscientific insights to the concept of free will incur consequences for questions of legal culpability? Can neuroscience provide metrics for, and standards of psychosocial "normality" and "abnormality" that are valid and viable within and across cultures? How will neuroscience and neurotechnologies be employed upon the twenty first century world stage to affect human health and capability, and evoke economic and political balances of power? Literature addressing these issues and questions will be presented in Part 4 of this bibliographic series. When taken together, we hope

that this bibliography will elucidate the literature that is representative of the first ten years of this field, provide a historical view of this discipline's growth, and afford insight to its developing canon.

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
MD and LB were responsible for data collection; MD and JG were responsible for data interpretation and manuscript preparation, and JG was responsible for study design, and revision and critical review of the manuscript. The authors have approved the final version of the manuscript.

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