

Brains, Identity, and Moral Agency
Steven E. Hyman
Spring 2014

Lectures: Wednesdays 1-2:30 PM, Biolabs 1080

Section: Mondays 1-2:30 PM, Fairchild G062 or Fairchild 268 or Bauer 001

Office Hours (*beginning Wednesday, 2/5*): Wednesdays, 10:30 AM - noon and 4:00 PM - 5:00 PM, Bauer 203 (unless otherwise noted)

Enrollment: Limited to 60 students (three sections).

Human beings experience a coherent sense of self that seems to provide a stable foundation from which to understand personal experience, consciously formulate goals, and initiate actions. The concept of moral agency is based on the view that people act in accordance with their characters and their freely formed intentions. However, evidence from neuroscience suggests that memories and personal identity are more mutable than is generally recognized, and both are increasingly subject to alteration by therapeutically intended manipulations. This course will examine competing views of human identity and moral agency grounded in a series of concrete scientific examples. The overall goal of this course is to encourage serious reflection and discussion on the implications of neuroscience for ethics and policy.

Prerequisites

This course requires LPS A or LS1a or equivalent (which would require permission of the instructor). This course will require students to engage seriously with selected topics in neurobiology.

Course Website

<http://isites.harvard.edu/k101945>

Course Requirements / Grade Breakdown

The course requires informed engagement. Thus, students who enroll should be prepared to do the readings each week and to participate in discussions. I have attempted to ensure that the readings are important, but not excessive. As a result, I will feel free to ask specific questions about the readings in class.

Formal requirements include four papers of 3-4 pages each (45% of the course grade), a final assignment (requiring additional research beyond the course readings; 25%), participation in lecture/discussions (10%), and regular attendance and participation in a weekly discussion section (20%). All written assignments must be completed and uploaded to the course web site on time.

Assignments

- Wednesday, 2/12: Short Paper #1
(uploaded to the course website by 1 PM)
- Wednesday, 3/5: Short Paper #2
(uploaded to the course website by 1 PM)
- Wednesday, 4/2: Short Paper #3
(uploaded to the course website by 1 PM)
- Wednesday, 4/23: Short Paper #4
(uploaded to the course website by 1 PM)
- Thursday, 5/8: Final Assignment
(uploaded to the course website by 8 PM)

Academic Integrity

All written work submitted to the course must be the student's own. Students may discuss work with others but should be sure to write everything in their own words. Students also may not copy writings from textbooks, journals, or other sources without proper citations. Plagiarism is a very serious offense.

For an example of guidelines on how to properly cite work, please see:

<http://usingsources.fas.harvard.edu/icb/icb.do>

http://isites.harvard.edu/fs/docs/icb.topic839457.files/Guide_to_Citing_in_the_Life_Sciences.pdf

Topics

1. Exploiting human brain circuitry to treat psychiatric disorders
2. Representation of memory in the human brain
3. Treating memory disorders with stem cell therapies
4. Cognitive enhancement
5. The usurpation of memory by posttraumatic stress disorder
6. Memory consolidation, reconsolidation, editing, and false memories
7. Addiction and the brain
8. If addiction is a disease, is there any role for punishment? For involuntary treatment?
9. My brain made me do it: The question of free will and volition
10. Experimental manipulation of moral emotions
11. Manipulating moral emotions
12. Pharmacological manipulations of moral emotions
13. Human personal identity and moral agency
14. Modeling human neuropsychiatric disorders: from cells to transgenic or chimeric non-human primates

Books

Farah, M. J. Neuroethics. An introduction with readings. MIT Press 2010
(required)

Useful Background Readings on Ethical Theory

Copp, D. The Oxford Handbook of Ethical Theory. Oxford University Press, 2006.

- Brink, D.O. Some forms and limits of consequentialism
- McNaughton, D. and Rawling, P. Deontology
- Annas, J. Virtue ethics.

or

Stanford Encyclopedia of Philosophy. Sections that may have useful information include:

- Consequentialism
- Deontological Ethics
- Virtue Ethics
- Ethics, biomedical

<http://plato.stanford.edu>

Web Resources

Presidential Commission for the Study of Bioethical Issues (see session on December 18, 2013 which touches on this course.) www.bioethics.gov

President's Council on Bioethics. *Beyond Therapy. Biotechnology and the Pursuit of Happiness* (2003)

<http://bioethics.georgetown.edu/pcbe/reports/beyondtherapy/index.html>

Lectures

- 1. Monday 1/27.** Introduction to SCRB 187. Course mechanics and ground rules.
Introduction to brain circuitry, cognition, and emotion.
- 2. Wednesday 1/29.** Exploiting human brain circuitry to treat psychiatric disorders

Readings:

Mayberg, HS, Lozano, AM, Voon, V., et al. Deep brain stimulation for treatment-resistant depression. *Neuron* 45, 651-660, 2005

DARPA Broad Agency Announcement. Systems-Based Neurotechnology for Emerging Therapies (SUBNETS). Defense Sciences Office DARPA-BAA-14-09 (October 24, 2013)

Defense Advanced Projects Research Agency (DARPA) Broad Agency Announcement. Restoring Active Memory (RAM). Defense Sciences Office DARPA-BAA-14-08 (November 7, 2013)

Monday 2/3. NO SECTION

3. Wednesday 2/5. Representation of memory in the human brain

Readings:

Obituary: <http://www.nytimes.com/2008/12/05/us/05hm.html?pagewanted=all>

Eichenbaum H. What HM taught us. J Cog Neurosci 25:14-21, 2012

Mayford M, Siegelbaum SA, Kandel ER. Synapses and memory storage. Cold Spring Harb Perspect Biol;4:a005751, 2012

Monday 2/10. Section discussion.

Screening of *A Clockwork Orange* (time and date to be determined).

4. Wednesday 2/12. Treating memory disorders with stem cell therapies

Note: 1st Short Paper due by 1 PM.

Readings:

Blurton-Jones M, Kitazawa M, Martinez-Coria H, et al. Proc Natl Acad Sci USA 106:13594-99, 2009

Gage FH. 2012. Transplantation in the future. Progress in Brain Research 201:7

Optional/Recommended:

Aboudy K, Capela A, Niazi N, Stem JH, Temple S. 2011. Translating stem cell studies to the clinic for CNS repair: Current State of the art and the need for a Rosetta stone. Neuron 70: 597.

Monday 2/17. Presidents' Day Holiday – NO SECTION

Screening of *Memento* (time and date to be determined).

5. Wednesday 2/19. Cognitive Enhancement

Readings:

Farah, M (Ed). Reading 2.1 Flower, R. Lifestyle drugs: Pharmacology and the social agenda.

Farah, M (Ed). 2.4. President's Council on Bioethics. Beyond Therapy: Essential Source of Concern

Hyman SE. Cognitive enhancement: promises and perils. *Neuron* 69. 595-598, 2011

Suthana N, Haneef Z, Stern J, et al. 2012. Memory enhancement and deep brain stimulation of the entorhinal area. *N Engl J Med*. 366:502-510

Recommended: view the following website

<http://www.envivopharma.com/pipeline-nicotinic.php>

Monday 2/24. Section discussion.

6. Wednesday 2/26. The usurpation of memory by posttraumatic stress disorder

Readings:

Yehuda, R. Post-traumatic stress disorder. *N. Engl. J. Med*. 346, 108-114, 2002.

Johansen JP, Cain CK, Ostroff LE, LeDoux JE. 2011. Molecular mechanisms of fear learning and memory. *Cell* 147:509

Monday 3/3. Section discussion.

Screening of *Eternal Sunshine of the Spotless Mind* (time and date to be determined).

7. Wednesday 3/5. Memory consolidation, reconsolidation, editing, and false memories
Note: 2nd Short Paper due by 1 PM.

Readings:

Schiller, D, Monfils, M-H, Raio, CM, Johnson, DC, LeDoux, JE, and Phelps, EA. Preventing the return of fear in humans using reconsolidation update mechanisms. *Nature* 463:49-54, 2010

Kroes MCW, Tendolkar I, van Winger GA, et al. 2013. An electroconvulsive therapy procedure impairs reconsolidation of episodic memories in humans. Nat Neurosci. Epub ahead of print 22 Dec 2013.

Ramirez S, Liu X, Suh, J, et al. 2013. Creating a false memory in the hippocampus. Science 341:387.

Monday 3/10. Section discussion.

Readings:

Farah, M (Ed). Reading 3.1 President's Council on Bioethics. Memory blunting: ethical analysis.

Farah, M (Ed). Reading 3.2 Kolber, AJ. Ethical implications of memory dampening.

8. Wednesday 3/12. Addiction and the brain

Readings:

Hyman, SE, Malenka, RC, Nestler EJ. Neural mechanisms of addiction: the role of reward-related learning and memory. Annu. Rev. Neurosci. 29:565-598, 2006.

Monday 3/24. Section discussion.

Readings:

Charbonneau V Boehringer Ingelheim, US District Court of Minnesota

Dagher, A, Robbins TW. Personality, addiction, dopamine: Insights from Parkinson's disease. Neuron 61:505-10. 2009

9. Wednesday 3/26. If addiction is a disease, is there any role for punishment? For involuntary treatment?

Readings:

Farah, M (Ed). Reading 5.5 Boire, RG. State-imposed brain intervention: The case of pharmacotherapy for drug abuse.

Caplan, A. Denying autonomy in order to create it: the paradox of forcing treatment upon addicts. Addiction 103,1919-21, 2008.

Hall, W. Capps, B., Carter, A. The use of depot naltrexone under legal coercion: the case for caution. *Addiction* 103, 1922-24, 2008

Hulse, GK, Morris, N, Arnold-Reed, D, Tait RJ. 2009. Improving clinical outcomes in treating heroin dependence. *Arch Gen Psychiatry* 66: 1108-15.

Bonnie, RJ, Chen, DT, O'Brien CP. 2008. The impact of modern neuroscience on treatment of parolees. The Dana Foundation.

Monday 3/31. Section discussion.

10. Wednesday 4/2. My brain made me do it: The question of free will and volition
Note: 3rd Short Paper due by 1 PM.

Readings:

Farah, M (Ed). Reading 5.1 President's Council on Bioethics Staff. An overview of the impact of neuroscience evidence in criminal law.

Farah, M (Ed). Reading 5.2 Greene, J and Cohen, J. For the law, neuroscience changes nothing and everything.

Farah, M (Ed). Reading 5.4. Morse, SJ. Brain overclaim syndrome and criminal responsibility: A diagnostic note.

Review concepts of deontological ethics and consequentialism from Copp, D. *The Oxford Handbook of Ethical Theory* and the *Stanford Encyclopedia of Philosophy*.

Monday 4/7. Section discussion.

11. Wednesday 4/9. Experimental manipulation of moral emotions

Readings:

Churchland PS. 2013. Exploring the causal underpinnings of determination, resolve, and will. *Neuron* 80:1337

Parvizi J, Rangarajan V, Shirer W, et al. 2013. The will to persevere induced by electrical stimulation of the human cingulate gyrus. *Neuron* 80:1359-67.

Monday 4/14. Section discussion.

Readings:

Blair, J. 2013. The neurobiology of psychopathic traits in youths. *Nat Rev Neuroscience* 14:786-99

Ruff CC, Ugazio G, Fehr E. 2013. Changing social norm compliance with noninvasive brain stimulation. *Science* 342:482-4

12. Wednesday 4/16. Pharmacological manipulation of moral emotions

Readings:

Farah, M (Ed). Reading 3.3 Elliott, C. Prozac as a way of life.

Farah, M (Ed). Reading 3.4 Kramer, PD. The valorization of sadness: Alienation and the melancholic temperament.

Crockett MJ, Apergis-Schoute, A, Herrman B, Lieberman MD, Muller U, Robbins TW, Clark L. 2013. Serotonin modulates striatal responses to fairness and retaliation in humans. *J Neurosci* 33:3505-3513

Monday 4/21. Section discussion.

13. Wednesday 4/23. Personal identity and moral agency

Note: 4th Short Paper due by 1 PM.

Readings:

Parfit D. 1971. Personal identity. *The Philosophical Review* 80:3-27

Farah, M (Ed). Reading 6.2 Personhood: An illusion rooted in brain function?

Monday 4/28. Section discussion.

14. Wednesday 4/30. Modeling human neuropsychiatric disorders: from cells to transgenic or chimeric non-human primates

Readings:

Hyman SE. Revolution stalled. *Science Trans Med* 4:155.

Note: 5/8 Final Assignment due by 8 PM.

In addition, there will be three movie nights (complete with pizza!) showing the following films:

A Clockwork Orange (1971)

Memento (2000)

Eternal Sunshine of the Spotless Mind (2004)

Based on student preferences, we will schedule a time for three evenings that are most convenient for students.