

# Psychology 269 - Neuroethics

Winter Quarter 2015, UCLA

**Instructor:** Jesse Rissman, [rissman@psych.ucla.edu](mailto:rissman@psych.ucla.edu), 6639 Franz Hall, office hours by appointment

**Class Time and Location:** Tu/Th 11:00am-12:15pm, 6461 Franz Hall

**Course Overview:** As our ability to measure and understand the functioning of the human brain has rapidly advanced, so too has our need to grapple with the ethical implications of these neuroscientific tools and discoveries. This seminar will introduce students to the emerging field of Neuroethics and create a forum for discussion and debate about a range of timely topics. We will critically examine the current and potential use of neuroimaging data in the legal system as a means to assess a person's memories, truthfulness, culpability, and the probability of future criminal behavior. We will consider the personal and societal consequences of the use of cognitively enhancing drugs, memory dampening techniques, brain stimulation, and neural prostheses. We will wrestle with the profound implications of scientists' newfound ability to measure neural signatures of conscious awareness in putatively vegetative patients. We will explore the ethical issues raised by neural and genetic biomarkers that can predict the onset of crippling neurodegenerative diseases. And we will debate the ethics of neuromarketing. With each topic we consider, our goal will not be to achieve consensus on what's right and what's wrong, but rather to understand the ethical quandaries and to think critically about ways that the field could go about addressing them. Students should leave this course with an enhanced appreciation of the many ways in which our work impacts society and a heightened commitment to public engagement.

**Assignments/Grading:** All students must read the assigned article(s) before each class and come prepared to engage in discussion and debate. Attendance and class participation will constitute 30% of your grade. Enrolled students must also sign up to facilitate class discussion during at least one class; this will constitute 35% of your grade. To prepare for this role, the student facilitator should not only read the assigned article(s), but also read some of the Additional Suggested Readings listed on the syllabus for that day. The student facilitator may choose to prepare a PowerPoint presentation to aid in the discussion of the topic at hand, but the goal should not be give us a lecture but rather to help describe the relevant neuroscientific and ethical issues and engage the group in a spirited discussion. To this end, the student facilitator should come prepared with questions to pose to the group (this could include role playing exercises, thought experiments, hypothetical scenarios, etc.). The remaining 35% of your grade will be based on a final term paper, due on March 19<sup>th</sup>, to be written on a topic of your choosing. Additional guidelines for the term paper assignment will be discussed in class.

*PDFs for all readings (both required and optional) will be posted on the course CCLE website.*

## Schedule of Topics:

### 1/6 & 1/8: INTRODUCTION – What is “neuroethics”?

Farah, MJ (2012). Neuroethics: the ethical, legal, and societal impact of neuroscience. *Annual Review of Psychology*, 63, 571–591.

Morein-Zamir, S & Sahakian, BJ (2010). Neuroethics and public engagement training needed for neuroscientists. *Trends in Cognitive Sciences*, 14(2), 49-51.

#### ADDITIONAL SUGGESTED READING:

Scott, TR (2012). Neuroscience may supersede ethics and law. *Science and Engineering Ethics*, 18(3), 433–437.

Greely, HT (2012). What If? The Farther Shores of Neuroethics. *Science and Engineering Ethics*, 18(3), 439–446.

### 1/13: The neuroscience of ethics

Prehn, K & Heekeren, HR (2014). Moral Brains–Possibilities and Limits of the Neuroscience of Ethics. In M. Christen (Ed.), *Empirically Informed Ethics Morality between Facts and Norms* (pp. 137-157). Springer.

#### ADDITIONAL SUGGESTED READING:

Casebeer, WD (2003). Moral cognition and its neural constituents. *Nature Reviews Neuroscience*, 4(10), 840–846.

Greene, J (2003). From neural 'is' to moral “ought”: what are the moral implications of neuroscientific moral psychology? *Nature Reviews Neuroscience*, 4(10), 846–849.

Miller, G (2008). The roots of morality. *Science*, 320(5877), 734–737.

Buckholtz, JW & Marois, R (2012). The roots of modern justice: cognitive and neural foundations of social norms and their enforcement. *Nature Neuroscience*, 15(5), 655–661.

### 1/15: Moral agency, responsibility, and the law

Greene, J & Cohen, JD (2004). For the law, neuroscience changes nothing and everything. *Philosophical Transactions of the Royal Society of London B*, 359(1451), 1775–1785.

#### ADDITIONAL SUGGESTED READING:

Mobbs, D, Lau, HC, Jones, OD, & Frith, CD (2007). Law, responsibility, and the brain. *PLoS Biology*, 5(4), e103.

Reardon, S (2014). Science in court: Smart enough to die? *Nature*, 506(7488), 284–286.

Shariff, AF, et al. (2014). Free Will and Punishment: A Mechanistic View of Human Nature Reduces Retribution. *Psychological Science*, 25(8), 1563–1570.

### 1/20: Do we even have free will? Where does neuroscience fit in?

Libet, B (2010). Do we have free will? *Journal of Consciousness Studies*, 6(8–9), 47–57.

Roskies, AL (2012). How does the neuroscience of decision making bear on our understanding of moral responsibility and free will? *Current Opinion in Neurobiology*, 22(6), 1022–1026.

#### ADDITIONAL SUGGESTED READING:

Morse, SJ (2007). The non-problem of free will in forensic psychiatry and psychology. *Behavioral Sciences & the Law*, 25, 203–220.

Hyman, SE (2007). The neurobiology of addiction: implications for voluntary control of behavior. *The American Journal of Bioethics*, 7(1), 8–11.

- Pierre, JM (2013). The neuroscience of free will: implications for psychiatry. *Psychological Medicine*, 1–10.
- Brass, M, Lynn, MT, Demanet, J, & Rigoni, D (2013). Imaging volition: what the brain can tell us about the will. *Experimental Brain Research*, 229(3), 301–312.
- Bode, S, et al. (2014). Demystifying “free will”: The role of contextual information and evidence accumulation for predictive brain activity. *Neuroscience and Biobehavioral Reviews*, 47C, 636–645.
- Ananthaswamy, A (2012). Brain might not stand in the way of free will. *New Scientist*.

### **1/22: Why is the legal system increasingly turning to neuroscientists?**

- Jones, OD, Wagner, AD, Faigman, DL, & Raichle, ME (2013). Neuroscientists in court. *Nature Reviews Neuroscience*, 14(10), 730–736.
- Buckholz, J. W., & Faigman, D. L. (2014). Promises, promises for neuroscience and law. *Current Biology : CB*, 24(18), R861–7.

#### ADDITIONAL SUGGESTED READING:

- Goodenough, O & Tucker, M (2010). Law and Cognitive Neuroscience. *Ann Rev of Law and Social Science*, 6(1).
- Schleim, S (2012). Brains in context in the neurolaw debate: the examples of free will and “dangerous” brains. *International Journal of Law and Psychiatry*, 35(2), 104–111.
- Jones, OD, Schall, JD, & Shen, FX (2014). Law and Neuroscience: Understanding the Issues. In *Law and Neuroscience* (pp. 1–41). Aspen Publishers.
- Meixner, JB (2015). Applications of neuroscience in criminal law: legal and methodological issues. *Current Neurology and Neuroscience Reports*, 15(2), 513.

### **1/27: Brains on trial**

No readings. We will watch and discuss excerpts from the 2013 PBS special *Brains on Trial with Alan Alda*. <http://www.pbs.org/program/brains-trial/>

### **1/29: Does a not-yet-fully-developed brain make adolescents less culpable for their actions?**

- Steinberg, L (2013). The influence of neuroscience on US Supreme Court decisions about adolescents' criminal culpability. *Nature Reviews Neuroscience*, 14(7), 513–518.
- Galvan, A (2014). Insights about adolescent behavior, plasticity, and policy from neuroscience research. *Neuron*, 83(2), 262-265.

#### ADDITIONAL SUGGESTED READING:

- Bonnie, RJ & Scott, ES (2013). The Teenage Brain: Adolescent Brain Research and the Law. *Current Directions in Psychological Science*, 22(2), 158–161.
- Casey, BJ & Caudle, K (2013). The Teenage Brain: Self Control. *Current Directions in Psychological Science*, 22(2), 82–87.
- Buchen, L. (2012, April 19). Science in court: Arrested development. *Nature*, pp. 304–306.
- National Juvenile Justice Network (2012). Using Adolescent Brain Research to Inform Policy: A Guide for Juvenile Justice Advocates.

### **2/3: Neurocriminology**

- Glenn, AL & Raine, A (2014). Neurocriminology: implications for the punishment, prediction and prevention of criminal behaviour. *Nature Reviews Neuroscience*, 15(1), 54–63.

ADDITIONAL SUGGESTED READING:

Hughes, V. (2010, March 18). Science in court: head case. *Nature*, pp. 340–342.

Anderson, NE & Kiehl, KA (2012). The psychopath magnetized: insights from brain imaging. *Trends in Cognitive Sciences*, 16(1), 52–60.

Aspinwall, LG, Brown, TR, & Tabery, J (2012). The double-edged sword: does biomechanism increase or decrease judges' sentencing of psychopaths? *Science*, 337(6096), 846–849.

Aharoni, E, Vincent, GM, Harenski, CL, Calhoun, VD, Sinnott-Armstrong, W, Gazzaniga, MS, & Kiehl, KA (2013). Neuroprediction of future rearrest. *Proceedings of the National Academy of Sciences*, 110(15), 6223–6228.

## **2/5: Neuroimaging techniques for lie detection**

Farah, MJ, Hutchinson, JB, Phelps, EA & Wagner, AD (2014). Functional MRI-based lie detection: scientific and societal challenges. *Nature Reviews Neuroscience*, 15(2), 123-131.

ADDITIONAL SUGGESTED READING:

Gamer, M. (2014). Mind reading using neuroimaging: Is this the future of deception detection? *European Psychologist*, 19(3), 172-183.

Ganis, G, Rosenfeld, JP, Meixner, J, Kievit, RA, & Schendan, HE (2011). Lying in the scanner: covert countermeasures disrupt deception detection by functional magnetic resonance imaging. *Neuroimage*, 55(1), 312-319.

Langleben, DD & Moriarty, JC (2013). Using brain imaging for lie detection: Where science, law, and policy collide. *Psychology, Public Policy, and Law*, 19(2), 222.

Rusconi, E & Mitchener-Nissen, T (2013). Prospects of functional magnetic resonance imaging as lie detector. *Frontiers in Human Neuroscience*, 7.

## **2/10: Memory on the witness stand**

Lacy, JW & Stark, CEL (2013). The neuroscience of memory: implications for the courtroom. *Nature Reviews Neuroscience*, 14(9), 649–658.

ADDITIONAL SUGGESTED READING:

Schacter, DL & Loftus, EF (2013). Memory and law: what can cognitive neuroscience contribute? *Nature Neuroscience*, 16(2), 119–123.

Howe, ML (2013). Memory development: implications for adults recalling childhood experiences in the courtroom. *Nature Reviews Neuroscience*, 14(12), 869–876.

Nine-part series by William Saletan: [http://www.slate.com/articles/health\\_and\\_science/the\\_memory\\_doctor.html](http://www.slate.com/articles/health_and_science/the_memory_doctor.html)

## **2/12: Neuroimaging techniques for memory detection**

Meegan, DV (2008). Neuroimaging techniques for memory detection: scientific, ethical, and legal issues. *The American Journal of Bioethics*, 8(1), 9–20. [also read associated commentaries]

ADDITIONAL SUGGESTED READING:

Bles, M & Haynes, J-D (2008). Detecting concealed information using brain-imaging technology. *Neurocase*, 14(1), 82–92.

Rissman, J, Greely, HT, & Wagner, AD (2010). Detecting individual memories through the neural decoding of memory states and past experience. *Proceedings of the National Academy of Sciences*, 107(21), 9849–9854.

Meixner, JB & Rosenfeld, JP (2014). Detecting knowledge of incidentally acquired, real-world memories using a P300-based concealed-information test. *Psychological Science*, 25(11), 1994–2005.

## **2/17: Can traumatic memories be dampened, modified, or erased? And if so, should they?**

Parsons, RG & Ressler, KJ (2013). Implications of memory modulation for post-traumatic stress and fear disorders. *Nature Neuroscience*, 16(2), 146–153.

Kolber, AJ (2011). Neuroethics: Give memory-altering drugs a chance. *Nature*, 476(7360), 275–276.

### ADDITIONAL SUGGESTED READING:

Lehrer, J (2012). The forgetting pill erases painful memories forever. *Wired.com*.

Kolber, AJ (2006). Therapeutic Forgetting: The Legal and Ethical Implications of Memory Dampening. *Vanderbilt Law Review*, 59 (5), 1561-1626.

Adler, J (2012). Erasing painful memories: The caustic imprint of a traumatic memory may fade or vanish with new drug and behavioral therapies. *Scientific American*, 306(5), 56–61.

Erler, A (2011). Does memory modification threaten our authenticity? *Neuroethics*, 4(3), 235–249.

Kroes, MCW, et al. (2014). An electroconvulsive therapy procedure impairs reconsolidation of episodic memories in humans. *Nature Neuroscience*. 17(2), 204-206.

Sandkühler, J & Lee, J (2013). How to erase memory traces of pain and fear. *Trends in Neurosci*, 36(6), 343–352.

Chandler, JA, Mogyoros, A, Rubio, TM, & Racine, E (2014). Another look at the legal and ethical consequences of pharmacological memory dampening: the case of sexual assault. *The Journal of Law, Medicine & Ethics*, 41(4), 859–71.

## **2/19: The ethical implications of cognitive-enhancing drugs**

Chatterjee, A (2007). Cosmetic Neurology and Cosmetic Surgery: Parallels, Predictions, and Challenges. *Cambridge Quarterly of Healthcare Ethics*, 16(02).

Greely, HT, et al. (2008). Towards responsible use of cognitive-enhancing drugs by the healthy. *Nature*, 456(7223), 702–705.

### ADDITIONAL SUGGESTED READING:

Hyman, SE (2011). Cognitive enhancement: promises and perils. *Neuron*, 69(4), 595–598.

Husain, M & Mehta, MA (2011). Cognitive enhancement by drugs in health and disease. *Trends in Cognitive Science*, 15(1), 28–36.

Forlini, C, et al. (2013). Navigating the enhancement landscape. Ethical issues in research on cognitive enhancers for healthy individuals. *EMBO Reports*, 14(2), 123–128.

Cabrera, LY (2014). How Does Enhancing Cognition Affect Human Values? How Does This Translate into Social Responsibility? *Current Topics in Behavioral Neurosciences*.

## **2/24: Do currently available “cognitive-enhancing” drugs even work?**

Smith, ME & Farah, MJ (2011). Are prescription stimulants “smart pills?” The epidemiology and cognitive neuroscience of prescription stimulant use by normal healthy individuals. *Psychological Bulletin*, 137(5), 717–741.

Lakhan, SE & Kirchgessner, A (2012). Prescription stimulants in individuals with and without attention deficit hyperactivity disorder: misuse, cognitive impact, and adverse effects. *Brain and Behavior*, 2(5), 661–677.

### ADDITIONAL SUGGESTED READING:

Vrecko, S (2013). Just How Cognitive Is “Cognitive Enhancement?” On the Significance of Emotions in University Students' Experiences with Study Drugs. *AJOB Neuroscience*, 4(1), 4–12.

CBS 60 Minutes video: Boosting Brain Power (<http://www.cbsnews.com/videos/boosting-brain-power/>)

## **2/26: The neuroethics of non-invasive brain stimulation for cognitive enhancement**

Hamilton, R, Messing, S, & Chatterjee, A (2011). Rethinking the thinking cap: ethics of neural enhancement using noninvasive brain stimulation. *Neurology*, 76(2), 187–193.

Cohen Kadosh, R, Levy, N, O'Shea, J, Shea, N, & Savulescu, J (2012). The neuroethics of non-invasive brain stimulation. *Current Biology*, 22(4), R108–11.

### ADDITIONAL SUGGESTED READING:

Fitz, NS & Reiner, PB (2013). The challenge of crafting policy for do-it-yourself brain stimulation. *Journal of Medical Ethics*.

Racine, E, Bell, E, & Zizzo, N (2014). Deep Brain Stimulation: A Principled and Pragmatic Approach to Understanding the Ethical and Clinical Challenges of an Evolving Technology. *Current Topics in Behavioral Neurosciences*.

Schutter, DJLG. (2014). Syncing your brain: electric currents to enhance cognition. *Trends in Cognitive Sciences*, 18(7), 331–333.

Davis, NJ & van Koningsbruggen, MG (2013). “Non-invasive” brain stimulation is not non-invasive. *Frontiers in Systems Neuroscience*, 7, 76.

Maslen, H, Earp, BD, & Kadosh, RC (2014). Brain stimulation for treatment and enhancement in children: an ethical analysis. *Frontiers in Human Neuroscience*, 8, 953.

## **3/3: Neuroenhancement for national security?**

Levasseur-Moreau, J, Brunelin, J, & Fecteau, S (2013). Non-invasive brain stimulation can induce paradoxical facilitation. Are these neuroenhancements transferable and meaningful to security services? *Frontiers in Human Neuroscience*, 7, 449.

Sehm, B & Ragert, P (2013). Why non-invasive brain stimulation should not be used in military and security services. *Frontiers in Human Neuroscience*, 7, 553.

### ADDITIONAL SUGGESTED READING:

Tennison, MN & Moreno, JD (2012). Neuroscience, ethics, and national security: the state of the art. *PLoS Biology*, 10(3), e1001289.

Clark, VP, et al. (2012). TDCS guided using fMRI significantly accelerates learning to identify concealed objects. *NeuroImage*, 59(1), 117–128.

## **3/5: Using brain imaging to clinically evaluate disorders of consciousness**

Fernández-Espejo, D., & Owen, A. M. (2013). Detecting awareness after severe brain injury. *Nature Reviews Neuroscience*, 14(11), 801–809.

### ADDITIONAL SUGGESTED READING:

Jox, RJ, Bernat, JL, Laureys, S, & Racine, E (2012). Disorders of consciousness: responding to requests for novel diagnostic and therapeutic interventions. *Lancet Neurology*, 11(8), 732–738.

Peterson, A, et al. (2013). Assessing decision-making capacity in the behaviorally nonresponsive patient with residual covert awareness. *AJOB Neuroscience*, 4(4), 3–14.

Monti, MM (2012). Cognition in the vegetative state. *Annual Review of Clinical Psychology*, 8, 431–454.

Laureys, S & Schiff, ND (2012). Coma and consciousness: paradigms (re)framed by neuroimaging. *NeuroImage*, 61(2), 478–491.

### **3/10: Ethical considerations when using neural biomarkers to predict the onset of disease**

Gauthier, S, Leuzy, A, Racine, E, & Rosa-Neto, P (2013). Diagnosis and management of Alzheimer's disease: past, present and future ethical issues. *Progress in Neurobiology*, 110, 102–113.

#### ADDITIONAL SUGGESTED READING:

Peters, KR, Lynn Beattie, B, Feldman, HH, & Illes, J (2013). A conceptual framework and ethics analysis for prevention trials of Alzheimer Disease. *Progress in Neurobiology*, 110, 114–123.

Wikler, EM, Blendon, RJ, & Benson, JM (2013). Would you want to know? Public attitudes on early diagnostic testing for Alzheimer's disease. *Alzheimer's Research & Therapy*, 5(5), 43.

### **3/12: Neuromarketing: Why ask people what they like when you could just ask their brains?**

Ariely, D, & Berns, GS (2010). Neuromarketing: the hope and hype of neuroimaging in business. *Nature Reviews Neuroscience*, 11(4), 284–292.

#### ADDITIONAL SUGGESTED READING:

Plassmann, H, Ramsøy, TZ, & Milosavljevic, M (2012). Branding the brain: A critical review and outlook. *Journal of Consumer Psychology*, 22(1), 18–36.

Venkatraman, V, et al. (2012). New scanner data for brand marketers: How neuroscience can help better understand differences in brand preferences. *Journal of Consumer Psychology*, 22(1), 143–153.

Ruanguttamanun, C (2014). Neuromarketing: I Put Myself into a fMRI Scanner and Realized that I love Louis Vuitton Ads. *Procedia - Social and Behavioral Sciences*. 148, 211-218.

#### **Useful resources:**

International Neuroethics Society, <http://www.neuroethicssociety.org>

Emory University's Neuroethics blog, <http://www.theneuroethicsblog.com>

Univ. of Pennsylvania's Center for Neuroscience and Society, <http://neuroethics.upenn.edu>

Adam Kolber's Neuroethics and Neurolaw blog, <http://kolber.typepad.com>

MacArthur Foundation Research Network on Law & Neuroscience, <http://lawneuro.org/blog/>

Law and Neuroscience eJournal, <http://www.ssrn.com/link/Law-Neuroscience.html>

#### **Books on neuroethics:**

Glannon, W. (Ed.) (2007). *Defining right and wrong in brain science: Essential readings in neuroethics*. Dana Press.

Farah, M. J. (2010). *Neuroethics, An Introduction with Readings*. The MIT Press.

Giordano, J. J., & Gordijn, B. (Eds.). (2010). *Scientific and philosophical perspectives in neuroethics*. Cambridge University Press.

Illes, J., & Sahakian, B. J. (Eds.). (2011). *Oxford handbook of neuroethics*. Oxford University Press.

Chatterjee, A., & Farah, M. J. (Eds.). (2013). *Neuroethics in practice*. Oxford University Press.

Clausen, J., & Levy, N. (Eds.). (2014). *Handbook of neuroethics*. Springer London.