

Psychology 124K
Ethical, Legal, and Societal Implications of Cognitive Neuroscience
Fall Quarter 2019, UCLA

Instructor: Jesse Rissman, rissman@psych.ucla.edu, 7538 Psychology Tower, office hour: Th 11am-12pm

Class Time and Location: Tu/Th 9:30-10:45am, Rolfe 3121

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. 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.

Grading breakdown:

5%: Attendance	20%: Debate Performance	30%: Paper #2
5%: Class Participation	10%: Paper #1	30%: Final Exam

Attendance: There will be an attendance sign-in sheet during each class session. If you must miss class due a medical or family emergency, please notify the instructor.

Class Participation: All students must read the assigned article(s) before each class and come prepared to engage in discussion and debate. The instructor will keep track of how much—and how thoughtfully—each student participates. It is not necessary to speak during every single class session to get full credit.

Debate Performance: Over the course of the quarter, we will have four in-class debates. Each debate will consist of two teams, with three students per team. One team will argue the PRO side and the other team will argue the CON side of a specific motion. Assignment of students to topics/teams will be done during the second week of class. You may not agree with your assigned stance, but you must try your best to make a persuasive case. You can use slides to help make your arguments (e.g., to show relevant data or list your key bullet points). Grading of your team's debate performance will be based on your level of preparation, the clarity and effectiveness of your arguments, and your response to cross-examination from the other team, as well as to questions from the audience. Although the class will vote for a winner at the end of each debate, winning or losing will NOT be factored into your grade. All members of each team are expected to participate equally and will be assigned the same grade, so please work very collaboratively with your teammates. If you have concerns about one or more of your teammates not contributing sufficiently to debate preparation, you can notify the instructor by email. Additional instructions about the debate format will be provided in class.

Paper #1 "Cognitive Neuroscience in the News" (Due on Oct 14th by 11:59pm): Find a recent news article (no more than 1 year old) that describes a new technological development or scientific

breakthrough related to cognitive neuroscience that poses (or may in the future pose) ethical concerns. The article need not explicitly mention the ethical issues/implications of the science, although it is okay if it does. In 600 words or less, you should briefly describe the science and discuss and evaluate the ethical issue(s) it raises. It is okay, and in fact encouraged, for you to inject your own opinions/reflections on the matter, but please be sure to give clearly articulated reasons for your opinions.

Paper #2 "Neuroethics Policy Recommendations" (Due on Dec 1st by 11:59pm): Pretend you've been tapped by the President's Commission for the Study of Bioethical Issues to write a report about a neuroethical issue (word limit = 1,800). You can choose whichever issue you'd like to write about, although you may not select the same topic you were assigned to formally debate. Your paper should review the relevant literature, address the key ethical questions head-on, and make a few policy recommendations (based on your reasoned opinion). Your recommendations could be for changes to federal and/or state legislation, courtroom practices, medical practices, research practices, business practices, and/or public education. And if you feel it is warranted, you could advocate for more research on a particular topic (please specify what questions need to be addressed), or for a ban on research of a particular type. Your grade will not be based on how strongly I agree with your analysis and opinions, but rather on how thoroughly and thoughtfully you articulated them.

Final Exam (Dec 13th, 3-5pm): This closed-notes comprehensive exam will consist of short answer and essay questions. Several example questions will be given to you before the exam to aid in your studying.

PDFs for all readings will be posted on the course CCLE website.

Schedule of Topics and Readings:

9/26 – Introduction to the emerging field of neuroethics

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

ADDITIONAL SUGGESTED READING:

Poldrack, RA & Farah, MJ (2015). Progress and challenges in probing the human brain. *Nature*, 526(7573), 371-379.

10/1 – The neuroscience of ethics

- 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.

ADDITIONAL SUGGESTED READING:

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

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.

Greene, J.D. (2014). The cognitive neuroscience of moral judgment and decision-making, in *The Cognitive Neurosciences V*, M.S. Gazzaniga, Ed. MIT Press.

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.

10/3 – NO CLASS

- Watch the 2013 two-part PBS special *Brains on Trial with Alan Alda*, and come to the next class prepared to discuss it. <http://www.pbs.org/program/brains-trial/>

10/8 – Discussion of *Brains on Trial*

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

10/10 – 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:

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.

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

Pierre, JM (2013). The neuroscience of free will: implications for psychiatry. *Psychological Medicine*, 1–10.

Sapolsky, RM (2004). The frontal cortex and the criminal justice system. *Philosophical Transactions of the Royal Society of London Series B, Biological Sciences*, 359(1451), 1787–1796.

10/15 – 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.

ADDITIONAL SUGGESTED READING:

- Greely, HT & Farahany, NA (2019). Neuroscience and the criminal justice system. *Annual Review of Criminology*, 2, 451–471.
- Buckholtz, JW & Faigman, DL (2014). Promises, promises for neuroscience and law. *Curr Biology*, 24(18), R861–7.
- Meixner, JB (2015). Applications of neuroscience in criminal law: legal and methodological issues. *Current Neurology and Neuroscience Reports*, 15(2), 513.

10/17 – Does a not-yet-fully-developed brain make adolescents less culpable for their actions?

- Galván, A (2014). Insights about adolescent behavior, plasticity, and policy from neuroscience research. *Neuron*, 83(2), 262–265.
- Buchen, L. (2012). Science in court: Arrested development. *Nature*, pp. 304–306.

ADDITIONAL SUGGESTED READING:

- Steinberg, L (2013). The influence of neuroscience on US Supreme Court decisions about adolescents' criminal culpability. *Nature Reviews Neuroscience*, 14(7), 513–518.
- Casey, BJ & Caudle, K (2013). The Teenage Brain: Self Control. *Current Directions in Psychological Science*, 22(2), 82–87.
- Bonnie, RJ & Scott, ES (2013). The Teenage Brain: Adolescent Brain Research and the Law. *Current Directions in Psychological Science*, 22(2), 158–161.

10/22 – 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.
- Poldrack, RA, Monahan, J, Imrey, PB, Reyna, V, Raichle, ME, Faigman, D, & Buckholtz, JW (2017). Predicting violent behavior: what can neuroscience add? *Trends in Cognitive Sciences*.

10/24 – 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.
- 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.

10/29 – Neuroimaging techniques for memory detection

- Rissman, J & Murphy, ERD (in press) Memory detection and the new science of mind reading. *Handbook of Human Memory*. Oxford University Press.

ADDITIONAL SUGGESTED READING:

- Meegan, DV (2008). Neuroimaging techniques for memory detection: scientific, ethical, and legal issues. *The American Journal of Bioethics*, 8(1), 9–20.
- 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.
- Schacter, DL & Loftus, EF (2013). Memory and law: what can cognitive neuroscience contribute? *Nature Neuroscience*, 16(2), 119–123.
- Lacy, JW & Stark, CEL (2013). The neuroscience of memory: implications for the courtroom. *Nature Reviews Neuroscience*, 14(9), 649–658.

10/31 – Can traumatic memories be dampened, modified, or erased?

- 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.
- Phelps, E. A., & Hofmann, S. G. (2019). Memory editing from science fiction to clinical practice. *Nature*, 1–8.

ADDITIONAL SUGGESTED READING:

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

11/5 – Debate #1: Should individuals be allowed to undergo procedures designed to dampen or erase their memories for specific events?

11/7: 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.
- 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.
- Smith, ME & Farah, MJ (2011). Are prescription stimulants “smart pills?” The epidemiology and cognitive neuroscience of prescription stimulant use by normal healthy individuals. *Psych 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.

11/12 – Debate #2: Should college campuses prohibit the use of “smart drugs” by students who do not have a clinically-documented mental health disorder?

11/14 – 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*.

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

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

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

11/19 – Debate #3: Should American football be banned (or its rules dramatically changed) given our knowledge of how damaging it can be to the brains of the players?

11/21 – 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:

Owen, AM (2019). The Search for Consciousness. *Neuron*, 102(3), 526–528.

Evers, K (2016). Neurotechnological assessment of consciousness disorders: five ethical imperatives. *Dialogues in Clinical Neuroscience*, 18(2), 155.

Graham, M., et al. (2015). An ethics of welfare for patients diagnosed as vegetative with covert awareness. *AJOB Neuroscience*, 6(2), 31-41.

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.

11/26 – Debate #4: Is it ethical for companies and politicians to hire neuromarketing firms to improve the effectiveness of their advertisements?

11/28 – NO CLASS (Thanksgiving)

12/3 – Ethical considerations when using neural biomarkers to predict the onset of neurodegenerative 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.

Sperling, RA, Karlawish, J, & Johnson, KA (2013). Preclinical Alzheimer disease—the challenges ahead. *Nature Reviews Neurology*, 9(1), 54-58.

Porteri, C, & Frisoni, GB (2014). Biomarker-based diagnosis of mild cognitive impairment due to Alzheimer's disease: how and what to tell. A kickstart to an ethical discussion. *Frontiers in Aging Neuroscience*, 6.

Tigano, V, Cascini, GL, Sanchez-Castañeda, C, Peran, P, & Sabatini, U (2019). Neuroimaging and Neurolaw: Drawing the Future of Aging. *Frontiers in Endocrinology*, 10, 587.

12/5 – Emerging ethical issues in artificial intelligence

•Bostrom, N, & Yudkowsky, E (2014). The ethics of artificial intelligence. *In The Cambridge Handbook of Artificial Intelligence* (pp. 316-334). Cambridge University Press.

ADDITIONAL SUGGESTED READING:

Bonnefon, JF, Shariff, A, & Rahwan, I (2016). The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573-1576.

Pessoa, L (2017). Do Intelligent Robots Need Emotion? *Trends in Cognitive Sciences*, 21(11), 817-819.

Zou J & Schiebinger L (2018) AI can be sexist and racist - it's time to make it fair. *Nature*. 559(7714):324-326.

Yuste, R, et al. (2017). Four ethical priorities for neurotechnologies and AI. *Nature*, 551(7679), 159–163.

DEBATE TOPICS:

1) The use of neuroscientific procedures to dampen or erase one's memories should be banned.

PRO: Although the ability to erase bad memories sounds nice in principle, there are many potential downsides to this including an inability to adequately testify about an event in trial and a lost opportunity to build personal strength from the process of coping with and overcoming the negative experience. There are also issues regarding informed consent and general safety.

CON: Some memories are extraordinarily painful to live with and can interfere with activities of daily living. If an individual wishes to take a drug to dampen or erase a bad memory, s/he should be allowed to do so.

2) College campuses should prohibit the use of “smart drugs” by students who do not have a clinically-documented mental health disorder.

PRO: The use of “smart drugs” by cognitively healthy students is both unfair and potentially unsafe. Formal policies should be put in place to ban these drugs.

CON: The purpose of college is to provide students with an education. If taking a “smart drug” helps a student study more effectively and consequently perform better on assignments and exams, why should that be banned?

3) American football should be banned (or its rules should be dramatically changed) given our knowledge of how damaging it can be to the brains of the players.

PRO: The scientific evidence is overwhelming that playing football can lead to chronic traumatic encephalopathy. It is irresponsible for us to sit back and watch while athletes slowly destroy their brains, and especially irresponsible to allow a new generation of youth to get involved. If adequate changes to the rules and helmet technology cannot be made, football should be banned.

CON: Football is a national pastime, and players are well aware of the risks they are taking. Professional athletes are well compensated for their activities, and it is not the responsibility of our society to prevent them from putting their brain health at risk. Many other sports have serious risks, and it would be unfair to single out football. Plus, more scientific work needs to be done to fully understand the long-term health consequences of football.

4) The use of neuromarketing firms by corporations and politicians should be banned.

PRO: The use of neuroimaging data to create ads that effectively hijack the brain's reward circuitry (or other circuits related to memory and decision-making) is crossing a line and should be banned.

CON: We are a nation of free markets and free speech. Tailoring an advertising campaign based on neuroimaging data is no different than tailoring it based on feedback from focus groups, and thus should be allowed and only minimally regulated.

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>

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

Books on neuroethics:

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.

Johnson, L. S. M., & Rommelfanger, K. S. (Eds.). (2017). *The Routledge Handbook of Neuroethics*. Routledge.

Illes, J. (Ed.). (2017). *Neuroethics: Anticipating the future*. Oxford University Press.

Racine, E., & Aspler, J. (Eds.). (2017). *Debates About Neuroethics: Perspectives on Its Development, Focus, and Future*. Springer.