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HS176V - Mind and Brain: Themes in the History of Neuroscience

Harvard University
Department of the History of Science
Tu & Th 3p – 4:15p – Science Center 469
HS 176V

Yvan Prkachin
Office Hours: TBD
or by appointment, Science Center 454



Course Description: This course will examine the development of the neurosciences from the late seventeenth century to the early twenty-first century, with the aim of providing the student with a firm foundation in their historical, philosophical, technical, and cultural contexts. Topics to be examined include the history of brain anatomy and the debates over the ‘seat of the soul’ in the early modern period, debates over materialism, automata and the human brain in the Enlightenment, the origins of ‘neuroscience’ in nineteenth-century debates over phrenology and the localization of mental faculties; the emergence reflex theory and arguments over the evolution of the nervous system; the relationship between ideas about race, gender and brain structure in the nineteenth century; the emergence of neurology and neurosurgery as medical specialties; lobotomy and the debates over psychosurgery; the ‘technological turn’ in the brain sciences and the emergence of ‘neuroscience’ during the Cold War; the birth of modern brain visualizing technologies such as EEG, PET and fMRI; Alzheimer’s, Parkinson’s and other diseases of the nervous system; artificial intelligence and neural networks; and contemporary debates over autism and ‘neurodiversity.’ Throughout the course, we will pay attention to particular key historical themes such as the role of race and gender in the neurosciences, philosophical debates over the nature of ‘mind,’ the role of technology in determining approaches to research and models of brain function, and the experience of neurological patients. This course is lecture-based, and aimed primarily at undergraduates.

Assessment:

Attendance and Participation: 20%

Midterm: 20%

Final Exam: 30%

Primary source analysis #1: 15%

Primary source analysis #2: 15%

No prior background in either the history of science, or neuroscience, is required.

Participation: This is a lecture-based course. You will be expected to complete required readings each week, and reflect on them in discussion sections. The exact way in which participation will be graded

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is open to revision. Neuroscience is frequently in the news, and *extra participation* credit will be considered for those students who participate in the Canvas site discussion board.

Exams: The midterm and final exams will take place on 5 March, and TBD respectively. The midterm will consist of 5 ID questions (from a selection of 9) and 2 short answer questions (from a selection of 4). The exam will last 75 minutes. The final exam will consist of 6 ID questions (from a selection of 12), and two short essay questions (from a selection of 5). The exam will last two hours.

Primary source analysis papers: You will be asked to prepare and submit two (2) primary source analysis papers. The papers must examine some aspect of the brain sciences, with reference to a key primary source text, and must employ appropriate secondary literature to help situate, contextualize and analyze the primary source. The papers will be approximately seven (7) pages in length, and should be appropriately cited and sourced. Paper one *must examine a source from the nineteenth century*, and paper two *must examine a source from the twentieth century*. The sources can be selected in consultation with the professor or teaching fellow. The papers are due on 12 March and 9 May respectively.

Schedule:

All readings will be provided as PDFs on the course Canvas site. In addition, students should consider purchasing Dittrich, Luke. *Patient H.M.: A Story of Memory, Madness, and Family Secrets*. New York: Random House Trade Paperbacks, 2017. This can be purchased at Amazon, or almost any good book store.

*indicates primary source

UNIT 1: The Brain Takes Shape

Week 1

Tuesday, January 29 (Lecture 1: A Bowl of Curds)

Introductions

Course topics, assignments, themes

Thursday, January 31 (Lecture 2: The New Anatomy and the Soul)

Images from Da Vinci, Vesalius, Willis, Descartes

Bynum, William F. "The Anatomical Method, Natural Theology, and the Functions of the Brain."

Isis 64, no. 4 (December 1973): 445–68.

Tuesday, February 5 (Man a Machine)

Riskin, J. "The First Androids." In *The Restless Clock: A History of the Centuries-Long Argument over What Makes Living Things Tick*, 113–50. University of Chicago Press, 2016.

*Huxley, T. H. "On the Hypothesis That Animals Are Automata and Its History." In *Method and Results*, 199–250. New York: D. Appleton, 1874. (SKIM)

Thursday, February 7 (A New Science of Man)

Poskett, James. "Phrenology, Correspondence, And The Global Politics Of Reform, 1815–1848."

The Historical Journal 60, no. 02 (June 2017): 409–42

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Shapin, Steven. "Phrenological Knowledge and the Social Structure of Early Nineteenth-Century Edinburgh." *Annals of Science* 32, no. 3 (May 1975): 219–43.

Optional:

Barker, Fred G. "Phineas among the Phrenologists: The American Crowbar Case and Nineteenth-Century Theories of Cerebral Localization." *Journal of Neurosurgery*, April 1995, 672–82.

Hamilton, Cynthia S. "'Am I Not a Man and a Brother?' Phrenology and Anti-Slavery." *Slavery & Abolition* 29, no. 2 (June 2008): 173–87.

Tuesday, February 12 (Evolution and the Brain)

*Hugblings Jackson, John. "Remarks on the Evolution and the Dissolution of the Nervous System," 1884. NOTE: This text is *challenging*, but worth the effort. Take your time.

Steinberg, David A. "The Origin of Scientific Neurology and Its Consequences for Modern and Future Neuroscience." *Brain* 137, no. 1 (January 2014): 294–300.

Gross, C. G. "The Hippocampus and Man's Place in Nature: A Case Study in the Social Construction of Neuroanatomy." In *Brain, Vision, Memory: Tales in the History of Neuroscience*, 136–78. Bradford Books, 1999.

Thursday, February 14 (Localizing Language)

Harrington, Anne. "Language Localization and the Problem of Asymmetry." In *Medicine, Mind, and the Double Brain: A Study in Nineteenth-Century Thought*, 35–69. Princeton University Press, 1989.

Domanski, Cezary W. "Mysterious 'Monsieur Leborgne': The Mystery of the Famous Patient in the History of Neuropsychology Is Explained." *Journal of the History of the Neurosciences* 22, no. 1 (January 2013): 47–52.

*Broca, Paul, "Remarks on the Seat of the Faculty of Articulated Language, Following an Observation of Aphemia (Loss of Speech)," *Bulletin de la Société Anatomique*, 6, 330-357. (skim) - <https://psychcentral.com/classics/Broca/aphemie-e.htm>

Tuesday, February 19 (Neurology Comes of Age)

Casper, Stephen T. "The Patient's Pitch: The Neurologist, the Tuning Fork, and Textbook Knowledge." In *The Neurological Patient in History*, edited by L. Stephen Jacyna and Stephen T. Casper, 21–43. NameBoydell & Brewer, 2012.

Micale, Mark S. "The Salpêtrière in the Age of Charcot: An Institutional Perspective on Medical History in the Late Nineteenth Century." *Journal of Contemporary History* 20, no. 4 (1985): 703–31.

Thursday, February 21 (Madness and the Brain)

Guenther, Katja. "In the Morgue: Theodor Meynert, Pathological Anatomy, and the Social Structure of Dissection." In *Localization and Its Discontents: A Genealogy of Psychoanalysis and the Neuro Disciplines*. Chicago: The University of Chicago Press, 2015.

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-----."In the Lecture Theater: Reflex and Diagnosis in Carl Wernicke's Krankenvorstellungen." In *Localization and Its Discontents: A Genealogy of Psychoanalysis and the Neuro Disciplines*. Chicago: The University of Chicago Press, 2015.

Tuesday, 26 February (Biophysics and the Conditioned Reflex)

Otis, Laura. "The Metaphoric Circuit: Organic and Technological Communication in the Nineteenth Century." *Journal of the History of Ideas* 63, no. 1 (2002): 105–28.

Todes, Daniel P. "From the Machine to the Ghost within: Pavlov's Transition from Digestive Physiology to Conditional Reflexes." *American Psychologist* 52, no. 9 (September 1997): 947–55.

Thursday, February 28 (A net, or a republic of cells?)

Pannese, Ennio. "The Golgi Stain: Invention, Diffusion and Impact on Neurosciences." *Journal of the History of the Neurosciences* 8, no. 2 (August 1, 1999): 132–40.

Otis, Laura. "Santiago Ramon y Cajal: The Neuron and the Net." In *Membranes: Metaphors of Invasion in Nineteenth-Century Literature, Science, and Politics*, 64–89. Baltimore: Johns Hopkins University Press, 2000.

Tuesday, March 5 (IN CLASS MIDTERM)

Midterm will consist of 5 ID questions (from a selection of 9) and 2 short answer questions (from a selection of 4). The exam will last 75 minutes.

Thursday, 7 March (Of Mice and Men)

Weidman, Nadine. "Psychobiology, Progressivism, and the Anti-Progressive Tradition." *Journal of the History of Biology* 29, no. 2 (1996): 267–308.

Lashley, Karl S. "In Search of the Engram." In *Physiological Mechanisms in Animal Behaviour.*, 454–82. Society of Experimental Biology Symposium. Cambridge, England: Cambridge University Press, 1950.

Tuesday, 12 March (The Wounded Brain Healed? – The Rise of Neurosurgery)

PAPER 1 DUE at Midnight.

Gavrus, Delia. "Men of Dreams and Men of Action: Neurologists, Neurosurgeons, and the Performance of Professional Identity, 1920-1950." *Bulletin of the History of Medicine* 85, no. 1 (2011): 57–92.

Elder, Rachel. "Speaking Secrets: Epilepsy, Neurosurgery, and Patient Testimony in the Age of the Explorable Brain, 1934–1960." *Bulletin of the History of Medicine* 89, no. 4 (2015): 761–89.

Thursday, 14 March (Breaking the Brain to Save the Mind – The Rise of Psychosurgery)

Pressman, Jack D. "Sufficient Promise: John F. Fulton and the Origins of Psychosurgery." *Bulletin of the History of Medicine* 62, no. 1 (1988): 1–22.

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“Psychosurgery—Old and New | Psychiatric Times.” Accessed January 18, 2019.
<http://www.psychiatristimes.com/schizophrenia/psychosurgeryold-and-new>.
Mass General Neurosurgeons and Psychiatrists Team Up To Treat Mental Illness
<https://www.massgeneral.org/neurology/news/newsarticle.aspx?id=5807>

Spring Break (Whoooo!) – No classes on Tuesday 19 or Thursday 2, March

Tuesday, March 26 (Guest Speaker – Luke Dittrich – H.M.)

Dittrich, Luke. *Patient H.M.: A Story of Memory, Madness, and Family Secrets*. New York: Random House Trade Paperbacks, 2017. (Selections)

Thursday, March 28 (The War of the Soups and the Sparks)

Hoffman, Brian B. “Ch 2 - Ruled by Glands.” In *Adrenaline*, 19–33. Cambridge, Mass., 2013.
Valenstein, Elliot S. “The Discovery of Chemical Neurotransmitters.” *Brain and Cognition* 49, no. 1 (June 2002): 73–95.

Tuesday, April 2 (Neurotransmitters and Psychopharmacology)

*Sacks, O. “Parkinsons and the Coming of L-Dopa.” In *Awakenings*. Knopf Canada, 2011. NOTE:
Treat this as a primary source – what kind of story is Sacks telling here?
Valenstein, E. “Discoveries of Psychotherapeutic Drugs.” In *Blaming the Brain: The Truth About Drugs and Mental Health*. Free Press, 2002.

OPTIONAL: Porter, Dorothy. “Reconfiguring the Parkinson’s Personality in the Twentieth and Twenty-First Centuries.” *Canadian Bulletin of Medical History* 33, no. 2 (September 2016): 465–92.

Thursday, April 4 (Seeing the Brain at Work? EEG to fMRI)

Borck, Cornelius. “Recording the Brain at Work: The Visible, the Readable, and the Invisible in Electroencephalography.” *Journal of the History of the Neurosciences* 17, no. 3 (July 16, 2008): 367–79.
Dumit, Joseph. “Objective Brains, Prejudicial Images.” *Science in Context* 12, no. 01 (March 1999): 173.

Tuesday, April 9 (Electrodes and Split Brains)

*Hubel, David H. “Evolution of Ideas on the Primary Visual Cortex, 1955-1978: A Biased Historical Account: Nobel Lecture, 8 December 1981.” *Bioscience Reports* 2, no. 7 (July 1982): 435–69.
*Sperry, R. W. “Cerebral Organization and Behavior: The Split Brain Behaves in Many Respects like Two Separate Brains, Providing New Research Possibilities.” *Science* 133, no. 3466 (June 2, 1961): 1749–57.

Thursday, April 11 (Machine a Man? Artificial Intelligence)

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Abraham, Tara H. "(Physio) Logical Circuits: The Intellectual Origins of the McCulloch–Pitts Neural Networks." *Journal of the History of the Behavioral Sciences* 38, no. 1 (2002): 3–25.

Edwards, P. N. "Ch 8 - Constructing Artificial Intelligence." In *The Closed World: Computers and the Politics of Discourse in Cold War America*, 239–73. MIT Press, 1997.

Tuesday, 16 April (Making Neuroscience)

Adelman, George. "The Neurosciences Research Program at MIT and the Beginning of the Modern Field of Neuroscience." *Journal of the History of the Neurosciences* 19, no. 1 (January 15, 2010): 15–23.

Thursday, 18 April (Plasticity Returns)

Gross, Charles G. "Neurogenesis in the Adult Brain: Death of a Dogma." *Nature Reviews Neuroscience* 1, no. 1 (October 2000): 67–73.

Schwartz, J. M., and S. Begley. "The Silver Springs Monkeys." In *The Mind and the Brain*, 132–62. HarperCollins, 2009.

Tuesday, 23 April (Big Brain Science)

"Decade of the Brain: Presidential Proclamation 6158 (Library of Congress)." Accessed January 19, 2019. <http://www.loc.gov/loc/brain/proclaim.html>.

Marcus, Gary. "Opinion | The Trouble With Brain Science." *The New York Times*, December 20, 2017, sec. Opinion. <https://www.nytimes.com/2014/07/12/opinion/the-trouble-with-brain-science.html>.

Thursday, 25 April (Review session)

No readings

Final Exam

Place and time TBD.

PAPER #2 DUE 9 May at Midnight

