

Scientific Fringe: Pseudo-science, fraud, hoaxes

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1 Blurb

The seminar is devoted to a philosophical, historical and sociological discussion of famous and not so famous cases of scientific blunders, fraud, bias and hoaxes. Through the discussion of these "exceptional cases" we will discuss scientific methodology, error-correcting social institutions, and experimental and ethical standards. Example case studies: Tabacco and cancer, twin studies in genetics, invented diseases etc. Methodological issues: experimental design (blind experiments, randomized controlled trials), statistical tests and their meaning, model selection. As far as possible we will discuss cases of scientific misconduct uncovered during the semester.

2 Introduction

- Science, Pseudo-Science, Imitation science
- Scientific norms (Merton, 1942)
- Motives, Ideals: Goodstein (chp. 1)
- Do we need a 'Science of ignorance' ?
- Inductive risk

Readings:

- Robert K. Merton, "The Normative Structure of Science" (1942), reprinted in Merton, *The Sociology of Science*, Norman W. Storer, ed. (Chicago: University of Chicago Press, 1973)

- Laudan, Larry. 1983. "The Demise of the Demarcation Problem." In *Physics, Philosophy and Psychoanalysis*, edited by R. S. Cohen and L. Laudan, 111–27. Dordrecht: D. Reidel.
- Pigliucci, Massimo. 2010. *Nonsense on Stilts: How to Tell Science from Bunk*. University Of Chicago Press.
- Gruenberger, Fred J. 1964. "A Measure for Crackpots How Does One Distinguish between Valid Scientific Work and Counterfeit 'Science'?" *Science* 145 (3639): 1413–15. <https://doi.org/10.1126/science.145.3639.1413>.
- Platt, John R. 1964. "Strong Inference." *Science* 146 (3642): 347–53.
- Douglas, Heather. 2000. "Inductive Risk and Values in Science." *Philosophy of Science* 67 (4): 559–79.
- Goodstein, David. 2010. *On Fact and Fraud: Cautionary Tales from the Front Lines of Science*. Princeton University Press.

3 Historical cases

- Mendel
- Piltdown Man
- Haeckel
- Kettlewell
- Cyril Burt
- Millikan
- Velikovsky

Readings:

- Hartl, Daniel L., and Daniel J. Fairbanks. 2007. "Mud Sticks: On the Alleged Falsification of Mendel's Data." *Genetics* 175 (3): 975–79.
- Richards, Robert J. 2009. "Haeckel's Embryos: Fraud Not Proven." *Biology & Philosophy* 24 (1): 147–54. <https://doi.org/10.1007/s10539-008-9140-z>.

- Gordin, Michael D. 2012. *The Pseudoscience Wars: Immanuel Velikovsky and the Birth of the Modern Fringe*. First Edition edition. Chicago: University Of Chicago Press.
- Kevles, Daniel J. 2000. *The Baltimore Case: A Trial of Politics, Science, and Character*. Reprint edition. W. W. Norton & Company.

4 Invented Diseases, Vanishing experiments: evidence in medicine, invented diseases, big pharma, and the reliability of scientific knowledge

Readings:

- Parker, Ian. 2013. "The Big Sleep." *The New Yorker*.
- Greenhalgh, T., J. Howick, N. Maskrey, and for the Evidence Based Medicine Renaissance Group. 2014. "Evidence Based Medicine: A Movement in Crisis?" *BMJ* 348 (jun13 4): g3725–g3725. <https://doi.org/10.1136/bmj.g3725>.

Additional resources:

- Seife, Charles. 2015. "Are Your Medications Safe?" *Slate*, February 9, 2015. http://www.slate.com/articles/health_and_science/science/2015/02/fda_inspections_fraud_fabrication_and_scientific_misconduct_are_hidden_from.single.html.
- Tozzi Alex, John, and Wayne. n.d. "How the U.S. Government Botched Its Multibillion-Dollar Plan to Beat Childhood Disease." *Bloomberg.Com*. Accessed February 17, 2015. <http://www.bloomberg.com/news/articles/2014-12-23/how-the-national-childrens-study-fell-apart>
- Cressey, Daniel. 2015. "Analysis of Trial Data Revives Flu-Drug Row." *Nature*, January. <https://doi.org/10.1038/nature.2015.16820>.
- "Big Pharma Plays Hide-the-Ball With Data." 2014. *Newsweek*. November 13, 2014. <http://www.newsweek.com/2014/11/21/medical-science-has-data-problem.html>.
- "Study Warns of Diet Supplement Dangers Kept Quiet by F.D.A." n.d. *Well*. Accessed April 13, 2015. <http://well.blogs.nytimes.com/2015/04/07/study-warns-of-diet-supplement-dangers-kept-quiet-by-f-d-a/>.

- Ghost writing in science: <https://en.wikipedia.org/wiki/Ghostwriter#Medical>

5 Hypothesis testing and selection

- P Values, p-value hacking, power, meta-analysis (2 sessions)
- RCT: gold standard?
- Perspective on EBM

Readings:

- Cartwright, Nancy. 2011. “A Philosopher’s View of the Long Road from RCTs to Effectiveness.” *The Lancet* 377 (9775): 1400–1401. [https://doi.org/10.1016/S0140-6736\(11\)60563-1](https://doi.org/10.1016/S0140-6736(11)60563-1).
- Worrall, John. 2007. “Evidence in Medicine and Evidence-Based Medicine.” *Philosophy Compass* 2 (6): 981–1022. <https://doi.org/10.1111/j.1747-9991.2007.00106.x>.
- Resources on history of RCTs (available on course website)

6 Meta-analysis

Readings:

- Harrison, Freya. 2011. “Getting Started with Meta-Analysis.” *Methods in Ecology and Evolution* 2 (1): 1–10. <https://doi.org/10.1111/j.2041-210X.2010.00056.x>.

7 Repligate: the replication crises in social psychology, and major cases of fraud (two sessions)

Readings:

- “Power of Suggestion - The Chronicle of Higher Education.” n.d. Accessed October 10, 2017. <http://www.chronicle.com/article/Power-of-Suggestion/136907/>.

- Meyer, Michelle N., and Christopher Chabris. 2014. “Why Psychologists’ Food Fight Matters.” *Slate*, July 31, 2014. http://www.slate.com/articles/health_and_science/science/2014/07/replication_controversy_in_psychology_bullying_file_drawer_effect_blog_posts.html.
- Pashler, Harold, and Eric-Jan Wagenmakers. 2012. “Editors’ Introduction to the Special Section on Replicability in Psychological Science: A Crisis of Confidence?” *Perspectives on Psychological Science* 7 (6): 528–30. <https://doi.org/10.1177/1745691612465253>.
- Schickore, Jutta. 2011. “What Does History Matter to Philosophy of Science? The Concept of Replication and the Methodology of Experiments.” *Journal of the Philosophy of History* 5 (3): 513–32. <https://doi.org/10.1163/187226311X599934>.
- Peterson, David. 2016. “The Baby Factory Difficult Research Objects, Disciplinary Standards, and the Production of Statistical Significance.” *Socius: Sociological Research for a Dynamic World* 2 (January): 2378023115625071. <https://doi.org/10.1177/2378023115625071>.
- Collaboration, Open Science. 2015. “Estimating the Reproducibility of Psychological.” *Science* 349 (6251): aac4716. <https://doi.org/10.1126/science.aac4716>.
- Gilbert, Daniel T., Gary King, Stephen Pettigrew, and Timothy D. Wilson. 2016. “Comment on ‘Estimating the Reproducibility of Psychological Science.’” *Science* 351 (6277): 1037–1037. <https://doi.org/10.1126/science.aad7243>.
- Pascal, Chris B. 1999. “The History and Future of the Office of Research Integrity: Scientific Misconduct and Beyond.” *Science and Engineering Ethics* 5 (2): 183–98. <https://doi.org/10.1007/s11948-999-0008-7>.
- Camerer, Colin F., Anna Dreber, Eskil Forsell, Teck-Hua Ho, Jürgen Huber, Magnus Johannesson, Michael Kirchler, et al. 2016. “Evaluating Replicability of Laboratory Experiments in Economics.” *Science*, March, aaf0918. <https://doi.org/10.1126/science.aaf0918>.
- Baker, Monya. 2016. “Biotech Giant Publishes Failures to Confirm High-Profile Science.” *Nature*, February. <https://doi.org/10.1038/nature.2016.19269>.

- Collins, H. M. 1975. “The Seven Sexes: A Study in the Sociology of a Phenomenon, or the Replication of Experiments in Physics.” *Sociology* 9 (2): 205–24. <https://doi.org/10.1177/003803857500900202>.
- Alberts, Bruce, Ralph J. Cicerone, Stephen E. Fienberg, Alexander Kamb, Marcia McNutt, Robert M. Nerem, Randy Schekman, et al. 2015. “Self-Correction in Science at Work.” *Science* 348 (6242): 1420–22. <https://doi.org/10.1126/science.aab3847>.

8 Philosophical and Historical Discussion of Statistical Methodology

9 Mass-Hysteria: Vaccines

Readings:

- Mnookin, Seth. 2011. *The Panic Virus: A True Story of Medicine, Science, and Fear*. Simon & Schuster.
- Conis, Elena. 2013. “A Mother’s Responsibility: Women, Medicine, and the Rise of Contemporary Vaccine Skepticism in the United States.” *Bulletin of the History of Medicine* 87 (3): 407–35. <https://doi.org/10.1353/bhm.2013.0047>.
- Largent, Mark A. 2012. *Vaccine: The Debate in Modern America*. Baltimore: Johns Hopkins University Press.
- Jacobson, Robert M, Paul V Targonski, and Gregory A Poland. 2007. “Why Is Evidence-Based Medicine so Harsh on Vaccines? An Exploration of the Method and Its Natural Biases.” *Vaccine* 25 (16): 3165–69. <https://doi.org/10.1016/j.vaccine.2007.01.049>.

10 Organized Doubt: Tobacco

Readings:

- Oreskes, Naomi, and Erik M. Conway. 2011. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. Bloomsbury Press.

11 Hoaxes: When and why are they needed

12 Institutional perspective

13 Conspiracy theories: epistemic failure or socio-political phenomenon?

Readings:

- Sunstein, Cass R., and Adrian Vermeule. 2009. “Conspiracy Theories: Causes and Cures*.” *Journal of Political Philosophy* 17 (2): 202–27. <https://doi.org/10.1111/j.1467-9760.2008.00325.x>.
- Dieguez, Sebastian, Pascal Wagner-Egger, and Nicolas Gauvrit. 2015. “Nothing Happens by Accident, or Does It? A Low Prior for Randomness Does Not Explain Belief in Conspiracy Theories.” *Psychological Science*, September, 0956797615598740. <https://doi.org/10.1177/0956797615598740>.
- Goertzel, Ted. 2010. “Conspiracy Theories in Science.” *EMBO Reports* 11 (7): 493–99. <https://doi.org/10.1038/embor.2010.84>.
- Glaser, April. 2016. “A Skeptic Infiltrates a Cruise for Conspiracy Theorists.” *WIRED*. February 9, 2016. <http://www.wired.com/2016/02/conspira-sea-cruise-know-truth/>.
- Cassam, Quassim. n.d. “The Intellectual Character of Conspiracy Theorists – Quassim Cassam | Aeon Essays.” *Aeon*. Accessed May 18, 2016. <https://aeon.co/essays/the-intellectual-character-of-conspiracy-theorists>.
- Aaronovitch, David. 2010. *Voodoo Histories: The Role of the Conspiracy Theory in Shaping Modern History*. Riverhead.

14 Conclusion: Trust, Reliability, Doubt, Ignorance, Deception

Readings:

- Shapin, Steven. 1995. “Cordelia’s Love: Credibility and the Social Studies of Science.”

- Shapin, Steven. 2011. *A Social History of Truth: Civility and Science in Seventeenth-Century England*. University of Chicago Press.
- Proctor, Robert, and Londa Schiebinger, eds. 2008. *Agnotology: The Making and Unmaking of Ignorance*. Stanford University Press.
- Lewandowsky, Stephan, Naomi Oreskes, James S. Risbey, Ben R. Newell, and Michael Smithson. 2015. “Seepage: Climate Change Denial and Its Effect on the Scientific Community.” *Global Environmental Change* 33 (July): 1–13. <https://doi.org/10.1016/j.gloenvcha.2015.02.013>.
- Ioannidis, John P. A. 2005. “Why Most Published Research Findings Are False.” *PLoS Med* 2 (8): e124. <https://doi.org/10.1371/journal.pmed.0020124>.
- ———. 2014. “How to Make More Published Research True.” *PLoS Med* 11 (10): e1001747. <https://doi.org/10.1371/journal.pmed.1001747>.
- “Why Do Many Reasonable People Doubt Science?” *National Geographic*. Accessed February 5, 2015. <http://ngm.nationalgeographic.com/2015/03/science-doubters/achenbach-text>.
- Jasanoff, Sheila. 2005. “Civic Epistemology.” In: S. Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States*, 247–71.