

Epistemology of Experiment --- Summer 2013

Philosophy Hauptseminar, University of Tübingen
Graduate School of Neural & Behavioural Sciences, Max Planck Research School

Class Meetings:

Tuesdays, 12:00 – 14:00
Burse, Schellingzimmer 218

Instructors:

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Description:

Does science reveal the truth about the world? From the historical conception of the experiment as a core feature of scientific practice, to the ongoing introduction of new experimental methods and technologies (e.g. double-blind experiments, particle accelerators), many questions have been raised about the ways that experiments tell us about the world. This seminar will look at conceptual questions like: What counts as an experiment? What counts as evidence? How can we know that unobservable things are real? What warrants generalizations? We will also review a range of experimental methods, examine how they work, and consider challenges to their reliability. The final two classes cover topics of recent controversy: statistical error in psychology, and the ethics of research on non-human primates.

Prerequisites:

Some familiarity with science is helpful, but not necessary.

Assessment:

Class participation

Everyone taking the course, whether for credit or not, is expected to prepare for class by doing the assigned readings, and to contribute to class discussions. We will call on you if you're too quiet!

Homework assignment (due July 16th)

With a partner from a different field, either a) design and run a pilot experiment on a problem unfamiliar to both of you, or b) observe in the role of ethnographers scientists in a field unfamiliar to both of you at work in their lab. Write a short report (max. 700 words) of your findings and methodological observations. Further instructions will follow.

3000 word essay (due August 30th)

Write a critical essay about one of the topics covered in the course, using at least 4 philosophical and scientific sources. A short abstract (~50 words) is due July 30th. We encourage you to submit a draft for comment at least a week before the due date. Further instructions will follow.

Texts:

All readings will be available either in the Burse library, in a Dropbox folder which you will have access to, or on the course [website](#).

Schedule:

April 16	Introduction (Class 1)	Shapin, S. and Schaffer, S. (1986/2011). <i>Leviathan and the Air-Pump</i> , Princeton University Press. Chapters 1,2 Dropbox http://www.stanford.edu/class/history34q/readings/ShapinSchaffer/ShapinSchaffer_Seeing.html (Chapter 2)
April 23	Under-determination (Class 2)	Duhem, P. (1954). <i>The Aim and Structure for Physical Theory</i> . Part II, Chap. 6. (Reprinted in Curd and Cover <i>Philosophy of Science: The Central Issues</i>). Dropbox Donald Gillies, "The Duhem Thesis and the Quine Thesis", in Curd and Cover, 302-319. Dropbox OPTIONAL: Quine, W. V. O. (1951). Two dogmas of empiricism. http://faculty.unlv.edu/jwood/wm/Quine.pdf
April 30	Theory-ladenness (Class 3)	Hanson, N. R. (1958). <i>Patterns of Discovery</i> . Chapter 1. http://www.cavehill.uwi.edu/bnccde/PH29A/hanson.html Heidelberger, M. (2003). Theory laden-ness and scientific instruments in experimentation. In H. Radder (Ed.), <i>The philosophy of scientific experimentation</i> . Dropbox (Radder philosophy 2)
May 7 th	Observation and Objectivity (Class 4)	Hacking, I. (1982). Experimentation and scientific realism. Reprinted in Curd and Cover, and available here: http://mechanism.ucsd.edu/teaching/philsci/hacking.experiments.pdf Hrdy, S. B. Empathy, polyandry, and the myth of the coy female. http://www.citrona.com/hrdy/documents/SBHMMythoftheCoyFemale397.pdf
May 14 th	Measurement (Class 5)	Chang, H. (2004). <i>Inventing Temperature: Measurement and Scientific Progress</i> . OUP. Chapter 2 Dropbox Franklin, A. (2002). Millikan's measurement of the charge of the electron. In <i>Selectivity and Discord</i> , University of Pittsburgh Press. Chapter 3 Dropbox
May 21 st	NO CLASS	
May 28 th	Construct Validity (Class 6)	Cronbach, L. and Meehl, P. E. (1955). Construct validity in psychology tests. <i>Psychological Bulletin</i> , 52, 281-302. http://psychclassics.yorku.ca/Cronbach/construct.htm Campbell, D. T. et al. (1979). <i>Experimental and Quasi-Experimental Designs for Generalized Causal Inference</i> . Chap. 2, 3. Dropbox Mook, D. (1983). In Defense of External Invalidity. <i>American Psychologist</i> , 379-387. http://www.uoguelph.ca/~psystats/readings_3380/mook%20article.pdf
June 4 th	Case Studies (Class 7)	Caramazza, A. (1986). On drawing inferences about the structure of normal cognitive system from the analysis of patterns of impaired performance: The case of single-patient studies. <i>Brain and Cognition</i> , 5, 41-66. Dropbox Shrader-Frechette, K. and McCoy, E. D. (1994). Applied ecology and the logic of case studies. <i>Philosophy of Science</i> , 61, 228-249. Dropbox
June	Animal	Ankeny, R. (1998). Fashioning descriptive models in biology: Of worms and wiring

11 th	Models (Class 8)	diagrams. <i>Philosophy of Science</i> , 67, S260-S272. Dropbox Weber, M. (2005). Model organisms: Of flies and elephants. In <i>Philosophy of Experimental Biology</i> , CUP, 154-187. Dropbox
June 18 th	Simulation (Class 9)	Morgan, M. (2003). Experiments without material intervention: Model experiments, virtual experiments and virtually experiments. In H. Radder (Ed.), <i>The philosophy of scientific experimentation</i> . Dropbox Winsberg, E. (2009). A tale of two methods. <i>Synthese</i> , 169, 575-592. http://www.cas.usf.edu/~ewinsb/A%20tale%20of%20two%20methods.pdf OPTIONAL: Küppers, G and Lenhard, J. (2004). The Controversial Status of Simulations. <i>Proceedings of the 18th European Simulation Multiconference</i> . http://www.scs-europe.net/services/esm2004/pdf/esm-44.pdf OPTIONAL: Guala, F. (2002). Models, simulations, and experiments. In L. Magnani and N. Nersessian (Eds.) <i>Model-based reasoning: Science, technology, values</i> . http://users.unimi.it/guala/2002_Simulations.pdf
June 25 th	Neuro- imaging (Class 10)	Logothetis, N. K. (2008). What we can do and what we cannot do with fMRI. <i>Nature</i> , 453, 869-878. http://kyb.mpg.de/fileadmin/user_upload/files/publications/attachments/NikosNatureJune2008_%5b0%5d.pdf BACKGROUND: A brief introduction to fMRI http://www.fmrib.ox.ac.uk/research/introduction-to-fmri
July 2 nd	NO CLASS	HOMEWORK ASSIGNMENT to be completed during this period
July 9 th	NO CLASS	
July 16 th	Statistics and Error (Class 11)	Wagenmakers, E.-J., et al. (2011). Why psychologists must change the way they analyze their data: The case of psi. <i>Journal of Personality and Social Psychology</i> , 100, 426-432. Also Dropbox http://www.ejwagenmakers.com/2011/WagenmakersEtAl2011_JPSP.pdf Simmons, J., (2011) False-Positive Psychology: Undiscovers Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant, <i>Psychological Science</i> , 22(11), 1359-1366 Dropbox John, L. et al. (2012) Measuring the Prevalence of Questionable Research Practices With Incentives for Truth Telling, <i>Psychological Science</i> , 23(5), 524-532. Dropbox
July 23 rd	Values and Public Policy (Class 12)	Shrader-Frechette, K. (1994). <i>Ethics of Scientific Research</i> , Rowman and Littlefield. Chapter 2 Dropbox Douglas, H. (2009) <i>Science, Policy, and the Value-Free Ideal</i> , University of Pittsburgh Press. Chapter 4 Dropbox MPIBK, <i>Research on Non-Human Primates, and Policies on Animal Welfare and Animal Research</i> http://hirnforschung.kyb.mpg.de/en/animals.html http://hirnforschung.kyb.mpg.de/en/the-law.html