

PHIL-UA 90, Fall 2018

PHILOSOPHY OF SCIENCE

Time & Place Room 202, 5 Washington Place, 9.30 to 10.45 AM

Texts *Theory and Reality*, Peter Godfrey-Smith, University of Chicago Press, 2003.

- *The Structure of Scientific Revolutions*, Thomas Kuhn, University of Chicago Press, 2012. (Any edition that contains Kuhn's postscript will work. The pagination is just very slightly different in the latest edition.)
- Readings distributed via NYU Classes

Web Scanned readings will be posted on the course's NYU Classes site, which you access from NYU Home.

Course handouts are posted both at the Classes site and at my personal web page: www.strevens.org/classes/philsci18

Content What is science? How does it work? When it works, what kind of knowledge does it provide? Is there a scientific method? How do experiments provide evidence for theories? What is the nature of scientific explanation? How does the social organization of science contribute, if at all, to its success?

Evaluation Your total grade will be made up of:

First paper (due Oct 15)	20%
Second paper (due Nov 12)	20%
Third paper (due Dec 10)	20%
Class participation	10%
Take-home exam (due Dec 17)	30%

Papers should be 1800 to 2000 words long (about six pages with lines one-and-a-half spaced)

The take-home exam will be distributed in the final class (Dec 12)

Participation means some combination of: turning up for class; making useful remarks in class and recitations; finding interesting and relevant examples in the science news or elsewhere

Strevens Office hours are Mon 11:00–12:30 and by appointment
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Moses Students who require accommodation for a disability should consult with the Henry and Lucy Moses Center for Students with Disabilities at <https://www.nyu.edu/life/safety-health-wellness/students-with-disabilities>

READINGS PHIL SCIENCE

- Sep 5 Introduction
▷ Godfrey-Smith, *Theory and Reality*, chapter 1

Big Theories of Science

- Sep 10 The logical empiricist tradition
▷ Schlick, M., "Positivism and realism", pp. 86–102, 106–107
▷ Maxwell, G., "The ontological status of theoretical entities", pp. 3–11 (optional)
▷ Godfrey-Smith, *Theory and Reality*, chapter 2 (§2.4 is optional)
- Sep 12 The problems of induction
▷ Strevens, "The problem of induction" (background)
▷ Goodman, N., *Fact, Fiction, and Forecast*, pp. 72–75, 77–83
▷ Godfrey-Smith, *Theory and Reality*, chapter 3 (skip §3.3)
- Sep 17 Popper's falsificationism
▷ Popper, K., *The Logic of Scientific Discovery*, pp. 3–24, 27–29, 57 (intro to chapter 4), 60–67 (starting at "Thus my conflict...")
▷ Godfrey-Smith, *Theory and Reality*, chapter 4
- Sep 19 Popper continued
▷ Popper, K., *The Logic of Scientific Discovery*, pp. 264–273, 278–282
- Sep 24 Kuhn on normal science
▷ Kuhn, *Structure*, chapters 1 through 8
▷ Godfrey-Smith, *Theory and Reality*, chapter 5
- Sep 26 Kuhn on revolutions
▷ Kuhn, *Structure*, chapters 9 through 12 (pp. 96–103 and all of chap. 10 are optional)
▷ Godfrey-Smith, *Theory and Reality*, chapter 6
- Oct 1 Kuhn on progress
▷ Kuhn, *Structure*, chapters 13 and postscript
- Oct 3 Theory and observation
▷ Hanson, N. R., *Patterns of Discovery*, chapter 1
▷ Fodor, J. A., "Observation reconsidered", introduction, §3 (so omit §§1 & 2)
▷ Godfrey-Smith, *Theory and Reality*, chapter 10, §3
- Oct 8 Fall recess - no class
- Oct 9 Legislative Monday, but no class
- Oct 10 No class

Laws of Nature and Explanation

- Oct 15 Laws and explanation: Empiricism ◁ Due date
- ▷ Ayer, A. J., "What is a law of nature?", part II
 - ▷ Hempel, C. G. and P. Oppenheim, "Studies in the logic of explanation", pp. 135–146
 - First paper due
- Oct 17 Laws: Realism
- ▷ Dretske, F., "Laws of nature"
- Oct 22 Laws: Pluralism
- ▷ Mitchell, S., "Dimensions of scientific law"
- Oct 24 Explanation: Critique of empiricism
- ▷ Reread Hempel, C. G. and P. Oppenheim, "Studies in the logic of explanation", pp. 135–146
 - ▷ Salmon, W. C., *Four Decades of Scientific Explanation*, pp. 46–50
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 13 (optional)
- Oct 29 Explanation: The causal approach
- ▷ Strevens, M., "The causal and unification approaches to explanation unified—causally"
- Oct 31 Laws and explanation: Cartwright
- ▷ Cartwright, N., "Truth doesn't explain much"
 - ▷ Cartwright, N., *The Dappled World: A Study of the Boundaries of Science*, pp. 1–6

Evidence

- Nov 5 Instantialism and the ravens
- ▷ Hempel, C. G., "Studies in the logic of confirmation", §§1–5
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 3, §3
- Nov 7 Bayesianism: Mechanics I
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §§1–4
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 14, §§1–4 (optional)
- Nov 12 Bayesianism: Mechanics II ◁ Due date
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §§5–6
 - Second paper due
- Nov 14 No class
- Nov 19 Bayesianism: Induction
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §7
- Nov 21 Thanksgiving recess – no class
- Nov 26 Bayesianism: Subjectivity
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §9

The Social Aspect of Science

Nov 28 Science and values

- ▷ Douglas, H., "Inductive risk and values in science"
- ▷ Godfrey-Smith, *Theory and Reality*, §9.1

Dec 3 Social critique of science

- ▷ Richardson, S. S., "Sexes, species, and genomes: Why males and females are not like humans and chimpanzees"
- ▷ Okruhlik, K., "Gender bias in the biological and social sciences" (optional)
- ▷ Godfrey-Smith, *Theory and Reality*, rest of chapter 9

Dec 5 The sociology of science: Merton

- ▷ Merton, R. K., "The normative structure of science" (optional)
- ▷ Merton, R. K., "Priorities in scientific discovery", pp. 635–646 (stop before *Humility*), 658–659
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 8

Dec 10 The sociology of science: Constructivism

- ▷ Collins, H. M., "The seven sexes"
- Third paper due

◁ *Due date*

Dec 12 The credit system in science

- ▷ Strevens, M., "The role of the priority rule in science"
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 11

No classes: the week of Oct 8th; Nov 14th; Nov 21st (Thanksgiving recess)

Papers are due on Oct 15; Nov 12; Dec 10

Take-home exam distributed Wed Dec 12; due Mon Dec 17 at 11 AM

REFERENCES PHIL SCIENCE

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- . (1983). *How the Laws of Physics Lie*. Oxford University Press, Oxford.
- . (1999). *The Dappled World: A Study of the Boundaries of Science*. Cambridge University Press, Cambridge.
- Collins, H. M. (1975). The seven sexes: A study in the sociology of a phenomenon, or the replication of experiments in physics. *Sociology* 9:205–224.
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- Merton, R. K. (1942). The normative structure of science. *Journal of Legal and Political Sociology* 1:115–126. Originally titled “Science and Technology in a Democratic Order”. Reprinted under the new title in Merton (1973).
- . (1957). Priorities in scientific discovery. *American Sociological Review* 22:635–659.
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- Okruhlik, K. (1994). Gender bias in the biological and social sciences. *Canadian Journal of Philosophy* supplementary volume 20:21–42.
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- . (2004). The causal and unification approaches to explanation unified—causally. *Noûs* 38:154–176.
- . (2012). Notes on Bayesian confirmation theory. Book-length lecture notes. Published online at <http://www.strevens.org/bct/>.