

# **CENTRAL TOPICS IN THE PHILOSOPHY OF SCIENCE**

## **2012-13 Course Guide**

**LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN  
FACULTY OF PHILOSOPHY, PHILOSOPHY OF SCIENCE AND THE  
STUDY OF RELIGION**

## **CENTRAL TOPICS IN THE PHILOSOPHY OF SCIENCE**

**Instructor:** Prof. Dr. Stephan Hartmann

**Contact Details:** Room 132, Ludwigstr. 31/I  
Tel: 089 2180 3320  
Email: Stephan.Hartmann@lrz.uni-muenchen.de

**Office hours:** Tuesdays, 14.00-16.00

**TA:** Ms. Chiara Lisciandra

**Contact Details:** Room 121, Ludwigstr. 31/I  
Tel: 089 2180 3894  
Email: Chiara.Lisciandra@lrz.uni-muenchen.de

**Office hours:** By appointment

# Introduction

## Overview

This course introduces central topics in general philosophy of science, including the problem of induction, confirmation and evidence, explanation and understanding, theory change, intertheoretic relations, social aspects of science, and the scientific realism debate. We will also examine selected problems from the philosophy of physics, the philosophy of psychology, and the philosophy of social science.

## Coursework

Students are requested to attend all sessions, to carefully study the reading assignments, to participate in the discussion, and to submit two concise discussion questions about the respective texts at least one day before the session through the *Google Group* page of the course. **To help us setting up the page, please send an email to Ms Lisciandra.**

By 15 March 2013, students have to submit a term paper (*Hausarbeit*) of 4000 words. Please include a word count. Outlines of 1000 words (what is the problem? Structure, literature list, etc.) have to be submitted by 1 February. The instructor will provide feedback. All students will also present their paper in the last session of the course.

## Aims and Objectives

This course is an introduction to most of the main problems and issues that have been discussed within analytical philosophy of science in the 20<sup>th</sup> century. By the end of the course, students should be familiar with most of the core problems along with the attempts to solve them, and be able to discuss them critically and in depth. Mastering the course provides the basis for further studies in philosophy of science at the graduate level.

## Assessment

The final mark will be determined *solely* by the term paper (*Hausarbeit*).

## Texts

**Main Texts** (*students should buy these*)

Curd, Martin and J. A. Cover (1998): *Philosophy of Science. The Central Issues*. New York and London: W. W. Norton. [Henceforth abbreviated as 'C&C']

Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press.

## **Contemporary Introductions to Philosophy of Science**

Bartels, Andreas and Manfred Stöckler (2007): *Wissenschaftstheorie: Ein Studienbuch*. Paderborn: Mentis-Verlag.

Bird, Alexander (1998): *Philosophy of Science*. London: Routledge.

Hitchcock, Christopher (ed.) (2004): *Contemporary Debates in Philosophy of Science*. Oxford: Blackwell.

- Kosso, Peter (1992): *Reading the Book of Nature. An Introduction to the Philosophy of Science*. Cambridge: Cambridge UP.
- Ladyman, James (2002): *Understanding Philosophy of Science*. London: Routledge.
- Lambert, Karel and Gordon Brittan (1992): *An Introduction to the Philosophy of Science*. Atascadero/CA: Ridgeview. 4<sup>th</sup> ed.
- Losee, John (1992): *A Historical Introduction to the Philosophy of Science*. Oxford: Oxford UP. 4th ed.
- Rosenberg, Alexander (2000): *Philosophy of Science. A Contemporary Introduction*. London: Routledge.
- Salmon, Marrilee et al. (1992): *Introduction to the Philosophy of Science*. Indianapolis and Cambridge: Hackett.
- Schurz, Gerhard (2011): *Einführung in die Wissenschaftstheorie*. Darmstadt: WBG.

### **Classical Textbooks**

- Braithwaite, Richard B. (1953): *Scientific Explanation*. Cambridge: Cambridge UP.
- Carnap, Rudolph (1966): *An Introduction to the Philosophy of Science*. New York: Dover 1995 (Repr. of: *Philosophical Foundations of Physics: An Introduction to the Philosophy of Science*. New York 1966).
- Hempel, Carl G. (1966): *Philosophy of Natural Science*. Princeton: Princeton UP.
- Nagel, Ernest (1961): *The Structure of Science*. Problems in the Logic of Scientific Explanation. New York 1961; repr. Indianapolis/Cambridge 1979: Hackett.
- Pap, Arthur (1963): *An Introduction to the Philosophy of Science*. London: Eyre and Spottiswoode.

### **Some Classical Texts**

- Cartwright, Nancy (1983): *How the Laws of Physics Lie*, Oxford: Oxford UP.
- Duhem, Pierre (1906): *La Théorie Physique, son Objet et sa Structure*. 1st ed. Paris 1906. Engl. trans. by Philip P. Wiener: *The aim and Structure of Physical Theory*. Princeton: Princeton UP 1954.
- Goodman, Nelson (1954): *Fact, Fact, and Forecast*. Cambridge/Ma and London: Harvard UP 1983.
- Hempel, Carl G. (1965): *Aspects of Scientific Explanation and other Essays in the Philosophy of Science*. New York.
- Howson, Colin and Peter Urbach (1989): *Scientific Reasoning: the Bayesian Approach*. Illinois: Open Court (second edition 1993).
- Hacking, Ian (1983): *Representing and Intervening*. Cambridge: Cambridge UP.
- Kuhn, Thomas (1962): *The Structure of Scientific Revolutions*. Chicago and London: Chicago UP (second edition 1969).
- Lakatos, Imre (1970): 'Falsification and the Methodology of Scientific Research Programmes', in Imre Lakatos and Alan Musgrave (eds.): *Criticism and the Growth of Knowledge*, Cambridge: Cambridge UP, pp. 91-196.
- Popper, Karl R. (1932): *The Logic of Scientific Discovery*. London: Routledge 2003. – (1989) *Conjectures and Refutations*. London: Routledge.
- van Fraassen, Bas (1980): *The Scientific Image*. Oxford: Oxford UP.

### **Companions and Encyclopaedias**

- Newton-Smith, Willam (ed.) (2000): *A Companion to the Philosophy of Science*. Malden/MA and Oxford: Blackwell.
- Machamer, Peter and Michael Silberstein (eds.) (2002): *The Blackwell Guide to the Philosophy of Science*. Oxford: Blackwell.

Psillos, Stathis and Martin Curd (eds.) (2010): *The Routledge Companion to Philosophy of Science*. London: Taylor & Francis.  
Sarkar, Sahotra (ed.) (2012): *Philosophy of Science: An Encyclopedia*. London: Routledge.

### **Web Resources**

*Routledge Encyclopaedia of Philosophy*  
*Stanford Encyclopaedia of Philosophy* (henceforth SEP): <http://plato.stanford.edu>  
The Internet Encyclopedia of Philosophy (henceforth IEP): <http://www.iep.utm.edu/>

### **Writing Analytical Philosophy**

Students with no prior training in analytical philosophy may find the following helpful when planning and writing essays:

Hübner, Dietmar (2012): *Zehn Gebote für das philosophische Schreiben: Ratschläge für Philosophiestudierende zum Verfassen wissenschaftlicher Arbeiten*. UTB.  
Weston, Anthony (2000): *A Rulebook for Arguments*. Indianapolis: Hackett.

## **Topics**

### **Week 1 (16 October 2012): Introduction**

No reading assignment.

## **Unit 1: Theory and Observation**

### **Week 2 (23 October 2012): The Problem of Induction**

#### **Required Reading**

Hume, David (1748): *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*. Ed. by L. A. Selby-Bigge. Oxford: Oxford UP 1997, Secs. 2-5. Online version: <http://18th.eserver.org/hume-enquiry.html>  
Howson, Colin (2000): *Hume's Problem. Induction and the Justification of Belief*. Oxford: Oxford UP, pp. 1-34.

#### **Background Reading**

Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press, ch. 2-3.  
Vickers, John (2010): The Problem of Induction, SEP, Secs. 1-4.

#### **Additional reading**

Goodman, Nelson (1954): *Fiction, Fact, and Forecast*. Cambridge/Mass.: Harvard UP 1983, ch. 3.

### **Week 3 (30 October 2012): Underdetermination and the Confirmation of Hypotheses**

#### ***Required Reading***

- Duhem, Pierre (1906): 'Physical Theory and Experiment', C&C, pp. 257-279.  
Laudan, Larry (1990): 'Demystifying Underdetermination', C&C, pp. 320-353.  
Popper, Karl (1932): 'The Problem of Induction', C&C, pp. 426-432.

#### ***Background Reading***

- Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press, ch. 4.

#### ***Additional reading***

- Feyerabend, Paul (1975): *Against Method*. London and New York: Verso.  
Earman, John (ed.) (1983): *Testing Scientific Theories*. Minnesota Studies in the Philosophy of Science: University of Minnesota Press, Vol. 10.  
Gillies, Donald (1993): 'The Quine Thesis and the Duhem Thesis', C&C pp. 302-319.  
Glymour, Clark (1980): *Theory and Evidence*. Princeton: Princeton UP, Ch. 2.  
Hempel, Carl G. (1966): 'Criteria of Confirmation and Acceptability', C&C pp. 445-459.  
Laudan, Larry (1990): 'Demystifying Underdetermination', C&C pp. 320-353.  
Miller, David (1994): *Critical Rationalism: A Restatement and Defence*. Chicago: Open Court.  
Putnam, Hilary (1974), 'The Corroboration' of Theories, in Paul Arthur Schilpp (ed.), *The Philosophy of Karl Popper*, Book I, La Salle/Ill; Open Court, pp. 221-240. Repr. in: Hilary Putnam (1975), *Mathematics, Matter and Method*, Phil. Papers, Vol. I, Cambridge/Ma.: Cambridge University Press, 1975, pp. 250-269.  
Quine, W. V. O. (1951): 'Two Dogmas of Empiricism', C&C pp. 280-301.  
Salmon, Wesley and John Earman (1992): 'The Confirmation of Scientific Hypotheses', in Salmon *et al.* (1992) Ch. 2, Parts I, II.  
Strawson, Peter F. (1952): *Introduction to Logical Theory*. London: Methuen, Ch. 9.  
Worrall, John (1989): 'Why Both Popper and Watkins Fail to Solve the Problem of Induction', in: Ian C. Jarvie and Fred D'Agostino (eds.): *Freedom and Rationality: Essays in Honor of John Watkins*. Dordrecht: Kluwer, pp. 257-296.

### **Week 4 (6 November 2012): Bayesianism I**

#### ***Required Reading***

- Strevens, Michael (2012), Notes on Bayesian Confirmation Theory, URL: <http://www.nyu.edu/classes/strevens/BCT/BCT.pdf>, Secs. 1-6.  
Talbot, William (2008): 'Bayesian Epistemology'. SEP, Secs. 1-4.

#### ***Background Reading***

- Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press, ch. 14.  
Hajek, Alan: 'Interpretations of Probability', SEP.

#### ***Additional reading***

##### *Probabilities*

- Eagle, Anthony (2010): *Philosophy of Probability: Contemporary Readings*. London: Routledge.

- Galavotti, Maria Carla (2005): *Philosophical Introduction to Probability*. Stanford: CSLI Publications, Lecture Notes 167.
- Gillies, Donald (2000): *Philosophical Theories of Probability*. London; Routledge.
- Horwich, Paul (1993): 'Wittgensteinian Bayesianism', C&C pp. 607-624.
- Howson, Colin (1995): 'Theories of Probability', *British Journal for The Philosophy of Science* 46, pp. 1-32.
- Lewis, David (1981): 'A Subjectivist's Guide to Objective Chance', in: David Lewis: *Philosophical Papers*, Vol. 2, Oxford: Oxford UP, pp. 83-132.
- (1994): 'Humean Supervenience Debugged', *Mind* 103: 473-390.
- Mellor, D. Hugh (2005): *Probability. A Philosophical Introduction*. Routledge: London.
- Salmon, Wesley and John Earman (1992): 'The Confirmation of Scientific Hypotheses', in Salmon *et al.* (1992) Ch. 2, Parts III and IV.
- von Plato, Jan (1994): *Creating Modern Probability*. Cambridge: Cambridge UP.
- Bayesianism*
- Bovens, Luc and Stephan Hartmann (2003): *Bayesian Epistemology*. Oxford: Oxford UP.
- Curd, Martin and J. A. Cover (1998): 'Bayes for Beginners', C&C pp. 627-638.
- Earman, John (1992): *Bayes or Bust?* Boston: MIT Press
- Howson, Colin (2000): *Hume's Problem. Induction and the Justification of Belief*. Oxford: Oxford UP.
- and Peter Urbach (1989): *Scientific Reasoning: the Bayesian Approach*. Illinois: Open Court (second edition 1993).
- Joyce, James: 'Bayes's Theorem', in: *Stanford Encyclopedia of Philosophy*.

## **Week 5 (date to be announced): Bayesianism II**

### ***Required Reading***

- Glymour, Clark (1980): 'Why I am not a Bayesian', C&C, pp. 584-606.
- Norton, John (2011): Challenges to Bayesian Confirmation Theory, in Prasanta S. Bandyopadhyay and Malcolm R. Forster (eds.): *Handbook of the Philosophy of Science, Vol 7: Philosophy of Statistics*. Elsevier. URL: [http://www.pitt.edu/~jdnorton/papers/Challenges\\_final.pdf](http://www.pitt.edu/~jdnorton/papers/Challenges_final.pdf)

### ***Additinal Reading***

- Bovens, Luc and Stephan Hartmann (2003): *Bayesian Epistemology*. Oxford: Oxford UP, ch. 3.
- Curd, Martin and J. A. Cover (1998): 'Commentary', C&C, pp. 646-74.
- Strevens, Michael (2012), Notes on Bayesian Confirmation Theory, URL: <http://www.nyu.edu/classes/strevens/BCT/BCT.pdf>, Secs. 7-11.

## **Unit 2: Theories, Models, and Laws**

### **Week 6 (20 November 2012): Theories and models**

#### ***Required reading***

- Giere, Ronald N. (1988): *Explaining Science. A Cognitive Approach*. Chicago: Chicago UP, Ch. 3.

Suppe, Frederick (1972): 'What's Wrong with the Received View of the Structure of Scientific Theories', *Philosophy of Science* 39, pp. 1-19.

### **Background Reading**

Frigg, Roman and Stephan Hartmann (2012): 'Models in Science', SEP.

### **Additional reading**

Carnap, Rudolph (1939): 'The interpretation of Physics', repr. in: Herbert Feigl and May Brodbeck: *Readings in The Philosophy of Science*. New York 1953, pp. 309-318.

Carnap, Rudolf (1956): 'The Methodological Status of Theoretical Concepts', in: Herbert Feigl and Michael Scriven (eds.): *Minnesota Studies in the Philosophy of Science Vol. 1*, pp. 38-77.

Hempel, Carl G. (1966): *Philosophy of Natural Science*. Princeton:Princeton UP, Ch. 6.

Lloyd, Elisabeth (1984): 'A Semantic Approach to the Structure of Population Genetics', *Philosophy of Science* 51, pp. 242-64.

Nagel, Ernest (1961): *The Structure of Science. Problems in the Logic of Scientific Explanation*. New York 1961; repr. Indianapolis and Cambridge: Hackett 1979, Chs. 5 and 6.

Putnam, Hilary (1962): 'What Theories are Not', in: Ernest Nagel, Alfred Tarski and Patrick Suppes (eds.): *Logic, Methodology, and Philosophy of Science*. Reprinted in: Hilary Putnam: *Mathematics, Matter, and Method. Philosophical Papers, Volume I*. Cambridge 1975, pp. 215-227.

Suppe, Frederick (ed.) (1977): *The Structure of Scientific Theories*. Chicago: Chicago UP.

– (1989): *The Semantic Conception of Theories and Scientific Realism*. Chicago: Chicago UP.

Suppes, Patrick (1960a): 'A Comparison of the Meaning and Uses of Models in Mathematics and the Empirical Sciences', in: Patrick Suppes: *Studies in the Methodology and Foundations of Science. Selected Papers from 1951 to 1969*. Dordrecht: Reidel 1969, pp. 10-23.

– (1967): 'What is a Scientific Theory', in: Sidney Morgenbesser (ed.): *Philosophy of Science Today*. New York: Basic Books, pp. 55-67.

**NOTE: There is no class on 27 November.**

## **Week 7 (4 December 2012): Laws of nature**

### **Required Reading**

Ayer, Alfred J. (1956): 'What is a Law of Nature?', C&C, pp. 808-825.

Cartwright, Nancy (1983): 'Do the Laws of Physics State Facts?', C&C, pp. 865-877.

### **Background Reading**

Carroll, John (2011): 'Laws of Nature'. SEP.

### **Additional reading**

Armstrong, David M. (1983): *What is a Law of Nature?* Cambridge: Cambridge UP.



- Beauchamp, Tom L. (ed.) (1974): *Philosophical Problems of Causation*. Encino and Belmont: Dickenson.
- Carroll, John W.: *Laws of Nature*. Stanford Encyclopaedia.
- Cartwright, Nancy (1999): *The Dappled World. A Study in the Boundaries of Science*. Cambridge: CUP, Chs. 2 and 3.
- Chalmers, Alan (1993): 'So the Laws of Physics Needn't Lie', *Australasian Journal of Philosophy* 71, pp. 196-205.
- Dretske, Fred (1977): 'Laws of Nature', C&C pp. 826-845.
- Earman, John (1984): 'Laws of Nature: The Empiricist Challenge', in: R. Bogdan (ed.): *D. M. Armstrong*. Dordrecht: Reidel, pp. 191-223.
- Giere, Ronald N. (1995): 'The Sceptical Perspective: Science without Laws of Nature', in: Friedel Weinert (ed.): *Laws of Nature: Essays on the Philosophical, Scientific, and Historical Dimensions*. New York: De Gruyter.
- Giere, Ronald (1999): *Science Without Laws*, Chicago: University of Chicago Press.
- Goodman, Nelson (1954): *Fact, Fact, and Forecast*. 4<sup>th</sup> ed., Cambridge/Ma and London: Harvard UP1983, Ch.1.
- Kneale, William 1949: *Probability and Induction*. Oxford (repr. 1966). Part II.
- Lewis, David (1973): *Counterfactuals*. Cambridge/Ma: Harvard UP.
- Loewer, Barry (1996): 'Humean Supervenience', *Philosophical Topics* 24, pp. 101-126.
- Molnar, George (1969): Kneale's Argument Revisited. *Philosophical Review* 78, pp. 79-89.
- Ramsey, Frank P. (1978): *Foundations*, London: Routledge and Kegan Paul, therein: 'Theories'.
- Rescher, Nicolas 1969: Lawfulness as Mind-Dependent. In: Rescher (ed.): *Essays in Honor of Carl G. Hempel. A Tribute on the Occasion of his Sixty-Fifth Birthday*. Dordrecht: Reidel, pp. 178-197.
- Tooley, Michael 1977: 'The Nature of Laws', *Canadian Journal of Philosophy* 7, pp. 67-98.
- van Fraassen, Bas C. (1989): *Laws and Symmetry*. Oxford: Oxford UP.

### **Unit 3: Explanation and Causation**

#### **Week 8 (11 December 2012): Non-causal explanation**

##### ***Required Reading***

- Carnap, Rudolph (1966): 'The Value of Laws: Explanation and Prediction', C&C, pp. 678-684.
- Hempel, Carl G. (1965): 'The Thesis of Structural Identity', C&C, pp. 695-705.
- Kitcher, Philip (1981): 'Explanatory Unification', *Philosophy of Science* 48, 507-31.

##### ***Background Reading***

- Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press, Ch.13.

##### ***Additional reading***

- Hempel, Carl and Paul Oppenheim (1948): 'Studies in the Logic of Explanation'. *Philosophy of Science* 15, pp. 135-75.

- Kitcher, Philip and Wesley Salmon (eds.) (1989): *Scientific Explanation*. Minnesota Studies in the Philosophy of Science Vol. XIII. Minneapolis.
- Pitt, Joseph (ed.) (1988): *Theories of Explanation*. Oxford and New York.
- Salmon, Wesley (1989): 'Four Decades of Scientific Explanation', in: Philip Kitcher and Wesley Salmon (eds.) (1989), pp. 3-219; repr. independently by the Univ. of Minnesota Press, Minneapolis 1990.
- (1998): *Causality and Explanation*. Oxford: Oxford UP.
- Salmon, Wesley (1992): 'Scientific Explanation', in Salmon *et al.* (1992), Ch. 1, pp. 7-23.
- Ruben, David-Hillel (ed.) (1993): *Explanation*. Oxford: Oxford UP.
- van Fraassen, Bas C. (1980): *The Scientific Image*. Oxford, Ch. 5.

### *Unification*

- Friedman, Michael (1974): 'Explanation and Scientific Understanding', *Journal of Philosophy* 71, pp. 5-19.
- Kitcher, Philip (1976): 'Explanation, Conjunction, and Unification', *Journal of Philosophy* 73, pp. 207-12.
- (1989): 'Explanatory Unification and the Causal Structure of the World', in: Philip Kitcher and Wesley Salmon (eds.): *Scientific Explanation*. Minnesota Studies in the Philosophy of Science Vol. XIII. Minneapolis, pp. 410-505.
- Morrison, Margaret (2000): *Unifying Scientific Theories. Physical Concepts and Mathematical Structures*. Cambridge: Cambridge UP.

## **Week 9 (8 January 2012): Causal explanation**

### ***Required Reading***

- Hitchcock, Chris (2010): 'Probabilistic Causation', SEP.
- Machamer, Peter, Lindley Darden, and Carl Craver (2000). 'Thinking about Mechanisms'. *Philosophy of Science* 67: 1-25.

### ***Additional reading***

- Beauchamp, Tom L. and Alexander Rosenberg (1981): *Hume and the Problem of Causation*. New York and Oxford: Clarendon.
- Cartwright, Nancy (1979): 'Causal Laws and Effective Strategies', *Noûs* 13; repr. in Cartwright (1983): *How the Laws of Physics Lie*. Oxford: Oxford UP, pp. 21-43.
- (2001): 'What's wrong with Bayes' Nets', *Monist* 82, pp. 242-64.
- (2002): 'Against Modularity, the Causal Markov Condition, and Any Link between the Two: Comments on Hausman and Woodward', *British Journal for the Philosophy of Science* 53, pp. 411-53.
- Dowe, Phil (1992): 'Wesley Salmon's Process Theory of Causality and the Conserved Quantity Theory', *Philosophy of Science* 59, pp. 195-216.
- (1995): 'Causality and Conserved Quantities: A Reply to Salmon', *Philosophy of Science* 62, pp. 321-333
- (1992a): 'An Empiricist Defence of the Causal Account of Explanation', *International Studies in the Philosophy of Science* 6, 123-8.
- (1992b): 'Process Causality and Asymmetry', *Erkenntnis* 37, 179-96.
- (1995): 'Causality and Conserved Quantities: A reply to Salmon', *Philosophy of Science* 62, 321-33.
- (1999): 'The Conserved Quantity Theory of Causation and Chance Raising', *Philosophy of Science* 66, supp. 486-501.

- Hall, Ned and Laurie Paul (2003): 'Causation and Pre-emption', in: Peter Clark and Katherine Hawley (eds.): *Philosophy of Science Today*. Oxford: OUP, pp. 100-130.
- Hausman, Daniel and James Woodward (1999): 'Independence, Invariance and the Causal Markov Condition', *British Journal for the Philosophy of Science* 50, pp. 521-584.
- Hitchcock, Christopher R. (1992): 'Causal Explanation and Scientific Realism', *Erkenntnis* 37, 151-78.
- (1995): 'Discussion: Salmon on Explanatory Relevance', *Philosophy of Science* 62, 304-20.
- Hitchcock, Chris (1995): 'Discussion: Salmon on Explanatory Relevance', *Philosophy of Science* 62, pp. 304-20.
- (2003): 'Of Humean Bondage', *British Journal for the Philosophy of Science* 54, pp. 1-25.
- Hume, David (1739): *A Treatise of Human Nature*. Ed by L.A. Selby-Bigge, Oxford: Clarendon, Book I, Parts I-III.
- (1748): *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*. Ed. by L. A. Selby-Bigge. Oxford: Oxford UP 1997, Secs, 2-7, First Enquiry, Sections I-VII.
- Lewis, David (1986): 'Causal Explanation', in: David Lewis: *Philosophical Papers*. New York and Oxford: OUP, pp. 214-40.
- Lewis, David (1993/1973): 'Causation', in: Ernest Sosa and Michael Tooley (eds.), *Causation*, Oxford: OUP, pp. 193-204.
- (1979): 'Counterfactual Dependence and Time's Arrow', *Noûs* 13, pp. 455-476.
- (1986): 'Postscripts to 'Causation'', in: *Philosophical Papers*, Vol. II, Oxford: OUP, pp. 172-213.
- (2000): 'Causation as Influence', *Journal of Philosophy* 97, pp. 182-97.
- Mackie, John (1974): *The Cement of the Universe: A Study of Causation*, Oxford: Clarendon Press.
- Mackie, John L. (1965): 'Causes and Conditions', *American Philosophical Quarterly* 2, 245-64; repr. in Ernest Sosa and Michael Tooley (eds.): *Causation*. Oxford 1993, 33-55.
- Mackie, John (1974): *The Cement of the Universe: A Study of Causation*, Oxford: Clarendon.
- Mill, John Stuart (1874): *A System of Logic*, New York: Harper, Book III.
- Psillos, Stathis (2002): *Causation and Explanation*, Chesham: Acumen.
- Russell, Bertrand (1913): 'On the Notion of Cause', *Proceedings of the Aristotelian Society* 13, pp. 1-26.
- Salmon, Wesley (1984): *Scientific Explanation and the Causal Structure of the World*, Princeton: Princeton University Press.
- (1994): 'Causality Without Counterfactuals', *Philosophy of Science* 61, pp. 297-312.
- Schaffer, Jonathan (2000): 'Trumping Preemption', *Journal of Philosophy* 97, pp. 165-81.
- Scheines, Richard (1997): 'An Introduction to Causal Inference', in Vaughn McKim and Stephen Turner (eds.): *Causality in Crisis?* Notre Dame: University of Notre Dame Press, pp. 185-200.
- Urbach, Peter (1987), *Francis Bacon's Philosophy of Science*, LaSalle: Open Court
- Woodward, James (1984): 'A Theory of Singular Causal Explanation', *Erkenntnis* 21, 223-62.

Woodward, James (2003): *Making Things Happen*, Oxford: Oxford UP.

## **Week 10 (15 January 2013): Intertheoretic Relations**

### ***Required Reading***

- Cartwright, Nancy (1999): *The Dappled World. A Study in the Boundaries of Science*. Cambridge: Cambridge UP, Introduction and Chapter 1.
- Dizadji-Bahmani, Foad, Roman Frigg and Stephan Hartmann (2010): Who's Afraid of Nagelian Reduction?, *Erkenntnis* 73(3): 393-412.
- Nagel, Ernest (1974): 'Issues in the Logic of Reductive Explanations', C&C pp. 905-921.

### ***Additional reading***

- Anderson, Philip W. (1972): 'More is Different', *Science*, New Series, Vol. 177, No. 4047, 393-396.
- Batterman, Robert: 'Intertheory Relations in Physics', *Stanford Encyclopaedia of Philosophy*.
- Dizadji-Bahmani, Foad, Roman Frigg and Stephan Hartmann (2011): Confirmation and Reduction: A Bayesian Account, *Synthese* 179 (2): 321-338.
- Dupré, John (1993): *The Disorder of Things. Metaphysical Foundations of the Disunity of Science*. Cambridge/Ma and London: Harvard UP, introduction and other chapters.
- Feyerabend, Paul (1963): 'How to Be a Good Empiricist – A Plea for Tolerance in Matters Epistemological', repr. in: C&C), pp. 922-949.
- (1981): 'Explanation, Reduction and Empiricism', in Paul Feyerabend (1981): *Realism, Rationalism and Scientific Method. Philosophical Papers, Vol. 1*. Cambridge: Cambridge UP, Ch. 4.
- Fodor, Jerry (1974): 'Special Sciences', repr. in Richard Boyd et al. (eds.) (1991): *The Philosophy of Science*. Cambridge/Ma: MIT Press, pp. 429-41.
- Garfinkel, Alan (1981): 'Reductionism', repr. in Richard Boyd et al. (eds.) (1991): *The Philosophy of Science*. Cambridge/Ma: MIT Press, pp. 443-59.
- Kim, Jaegwon (1993): *Supervenience and Mind: Selected Philosophical Essays*. Cambridge: Cambridge UP
- Kitcher, Philip (1984): '1953 and All That: A Tale of Two Sciences', C&C pp. 971-1003.
- Nagel, Ernest (1961): *The Structure of Science*. Problems in the Logic of Scientific Explanation. New York 1961; repr. Indianapolis/Cambridge 1979, Ch. 11.
- Nickles, Thomas (1975): 'Two Concepts of Intertheoretic Reduction', repr. in: C&C pp. 950-970.
- Oppenheim, Paul and Hilary Putnam (1958): 'Unity of Science as a Working Hypothesis', repr. in Richard Boyd et al. (eds.) (1991): *The Philosophy of Science*. Cambridge/Ma: MIT Press, pp. 405-27.
- Sklar, Lawrence (1967): 'Types of inter-theoretic reduction', *British Journal for the Philosophy of Science* 18, 109-124.
- Weinberg, Stephen (1993): *Dreams of a Final Theory. The Search for the Fundamental Laws of Nature*. London and Sydney: Vintage.

## Unit 4: Realism, Antirealism, and the Social Structure of Science

### Week 11 (22 January 2013): Scientific Realism

#### **Required Reading**

- Maxwell, Grover (1962): 'The Ontological Status of Theoretical Entities', C&C, pp. 1052-1062.
- Laudan, Larry (1981): 'A Confutation of Convergent Realism', C&C, pp. 1114-1135.
- van Fraassen, Bas (1980): 'Arguments Concerning Scientific Realism', C&C, pp. 1064-1087.

#### **Background Reading**

- Chackravartty, Anjan (2011): 'Scientific Realism'. SEP.
- Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press, ch. 12.

#### **Additional reading**

- Boyd, Richard (1981): 'Scientific Realism and Naturalistic Epistemology', *Proceedings of the Biennial Meeting of the Philosophy of Science Association* 1980 Vol. 2, 613-662.
- Boyd, Richard (1983): 'On the Current Status of Scientific Realism', *Erkenntnis* 19, pp. 45-90.
- Brown, James R. (1985): 'Explaining the Success of Science', C&C, pp. 1136-1152.
- Carnap, Rudolph (1966): *An Introduction to the Philosophy of Science*. New York 1995 (Repr. of: *Philosophical Foundations of Physics: An Introduction to the Philosophy of Science*. New York 1966).
- Cartwright, Nancy (1983): *How the Laws of Physics Lie*, Oxford: Oxford UP, Ch. 5.
- Churchland, Paul and Clifford A. Hooker (1985): *Images of Science: Essays on Realism and Empiricism, with a Reply from Bas C. van Fraassen*. Chicago: ChicagoUP.
- Churchland, Paul (1982): 'The Ontological Status of Observables: In Praise of the Superempirical Virtues', *Pacific Philosophical Quarterly* 63, pp. 226-236.
- Curd, Martin and J. A. Cover (1998): 'Commentary', C&C, pp. 1226-1289.
- Duhem, Pierre (1906): *La Théorie Physique, son Objet et sa Structure*. 1st ed. Paris 1906. Engl. trans. by Philip P. Wiener: *The aim and Structure of Physical Theory*. Princeton: Princeton UP 1954.
- Fine, Arthur (1984): 'The Natural Ontological Attitude', C&C, pp. 1186-1208.
- Fine, Arthur (1986): 'Unnatural Attitudes: Realist and Instrumentalist Attachments to Science', *Mind* 95, pp. 149-79.
- Glymour, Clark (1992): 'Realism and the Nature of Theories', in Salmon *et al.* (1992), Ch. 3.
- Hacking, Ian (1982): 'Experimentation and Scientific Realism', C&C pp. 1153-1168.
- Hacking, Ian (1983): *Representing and Intervening*. Cambridge: Cambridge UP, Chs. 1 and 16.
- Laudan, Larry (1990): 'Demystifying Underdetermination', C&C pp. 320-353.
- Leplin, Jarrett (ed.) (1984): *Scientific Realism*. Berkeley: University of California Press.
- (1997): *A Novel Defence of Scientific Realism*. New York and Oxford: Oxford UP.

- Lipton, Peter (2004): *Inference to the Best Explanation*. 2<sup>nd</sup> ed. London: Routledge.
- Harman, Gilbert (1965): 'The Inference to the Best Explanation', *Philosophical Review* 74, pp. 88-95.
- Musgrave, Alan (1985): 'Realism versus Constructive Empiricism', C&C, pp. 1088-1113.
- Psillos, Stathis (1999): *Scientific Realism. How Science Tracks Truth*. London: Routledge, Ch. 1.
- Psillos, Stathis (1999): *Scientific Realism. How Science Tracks Truth*. London: Routledge.
- (2000): 'The Present State of the Scientific Realism Debate', *British Journal for the Philosophy of Science* 51, 705-28.
- Quine, Willard Van Orman (1953): 'Two dogmas of Empiricism', C&C, pp. 280-301.
- Worrall, John (1989): 'Structural Realism: The Best of Both Worlds?' *Dialectica* 43, 99-124; repr. in: David Papineau (ed.): *The Philosophy of Science*. Oxford 1996, pp. 139-65.
- Worrall, John (1994): 'How to Remain (Reasonably) Optimistic: Scientific Realism and the "Luminiferous Ether"', *Proceedings of the Biennial Meetings of the Philosophy of Science Association* 1994, Vol. 1, pp. 334-42.
- Zahar, Elie (2001) *Poincaré's Philosophy. From Conventionalism to Phenomenology*. Chicago and La Salle.

## **Week 12 (29 January 2013): Kuhn's Challenge**

### **Required Reading**

- Kuhn, Thomas (1962): 'The Nature and Necessity of Scientific Revolutions', C&C, pp. 86-101.
- (1977): 'Objectivity, Value Judgement, and Theory Choice', C&C, pp. 102-118.

### **Background Reading**

- Godfrey-Smith, P. (2003): *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press, Chs. 5-7.

### **Additional reading**

- Bird, Alexander (2001): *Thomas Kuhn*. Princeton: Princeton UP.
- Hoyningen-Huene, Paul (1993): *Reconstructing Scientific Revolutions: Thomas S. Kuhn's Philosophy of Science*. Chicago: Chicago UP.
- Kuhn, Thomas (1962). *The Structure of Scientific Revolutions*. Chicago: Chicago UP.
- Lakatos, Imre (1970): 'Falsification and the Methodology of Scientific Research Programmes', in Imre Lakatos and Alan Musgrave (eds.): *Criticism and the Growth of Knowledge*, Cambridge: Cambridge UP, pp. 91-196.
- Laudan, Larry (1984): 'Dissecting the Holist Picture of Scientific Change', C&C pp. 139-169.
- McGuire, J. E. (1992): 'Realism and the Nature of Theories', in: Salmon *et al.* (1992), Ch. 4.
- McMullin, Ernan (1993): 'Rationality and Paradigm Change in Science', C&C, pp. 119-138.
- Psillos, Stathis (1999): *Scientific Realism. How Science Tracks Truth*. London: Routledge, Ch. 5.

**Week 14 (5 February 2013): Presentations and Final Discussion**