Causation, Chance, and Laws of Nature

Spring Quarter 2012

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In this class, we will cover three closely related topics in the philosophy of science: causation, chance and the laws of nature. Questions to be addressed include: What are laws of nature? Are there laws other than those described by physics (for instance, are there laws of biology, meteorology, or economics)? Are there *ceteris paribus* laws (that is, laws which hold 'other things being equal')? What is the nature of chance (objective probability)? Must chances derive from the laws? If so, do only fundamental physical laws (for example, those governing wave collapse in quantum mechanics) generate chances, or do the laws or generalizations of biology, etc. yield chances? Are the probabilities of statistical mechanics objective chances? Is chance compatible with determinism? What is causation? How does causation relate to chance? Does physics describe causal relations? Do the higher-level sciences describe causal relations?

Background Reading

A good and very simple introduction to probability theory, covering all the probability concepts needed for this course is:

★ D. Stirzaker: *Probability and Random Variables*: *A Beginner's Guide* (Cambridge: Cambridge University Press 1999). (=**SPV**)

Those who aren't already well versed in probability theory should ensure that they have read at least Chs. 1-2 by Week 3 of the course.

An excellent introductory text, which helps to illuminate a number of important themes from the course, is:

★ S. Psillos: *Causation and Explanation* (Chesham, Bucks: Acumen/Montreal&Kingston: McGill–Queens UP, 2002) (= **PCE**). Parts I and II on 'Causation' and 'Laws of Nature'.

Key Texts

In addition to the above:

★ D. M. Armstrong: *What is a Law of Nature* (Cambridge: Cambridge University Press, 1983). (=**ALN**)

★ D. Lewis: *Philosophical Papers*, Vol. 2 (New York: Oxford University Press, 1986). (= **LP2**)

★ D. Albert: *Time and Chance* (Cambridge, MA: Harvard University Press, 2000). (= **ATC**)

A useful resource, containing entries related to many of the topics we will discuss (and so often a good source for further reading) is:

★ *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.): <http://plato.stanford.edu/>. (= **SEP**)

Class 1: Historical Background

D. Hume: *An Enquiry Concerning Human Understanding*, ed. L.A. Selby-Bigge (Oxford: Oxford University Press, 1902). (First published in 1748.) Read Sections II-VII.

***Further Reading*:**

PCE, Ch. 1.

W. E. Morris: 'David Hume', in the **SEP**: <http://plato.stanford.edu/entries/hume/>, sections 1-12.

Class 2: Regularity Theories of Causation

J. L. Mackie: 'Causes and Conditions', *American Philosophical Quarterly*, Vol. 2 (1965), pp. 245-264.

***Further Reading*:**

PCE, Ch. 2.

Class 3: Probabilistic Theories of Causation

(Those who aren't already well versed in probability theory should first read **SPV**, Chs. 1-2.)

P. Suppes: *A Probabilistic Theory of Causality* (Amsterdam: North Holland, 1970), read pp. 1-12, the definition of *spurious* causes on p. 21, and the definition of *genuine* causes on p. 24.

H. Reichenbach: *The Direction of Time* (Berkeley & Los Angeles, CA: University of California Press, 1956). Read Section 19: 'The Principle of the Common Cause'. Also read definition of 'Causal Relevance' on p. 204.

W. Salmon: *Scientific Explanation and the Causal Structure of the World* (Princeton, NJ: Princeton University Press, 1984), pp. 43-5 on 'screening off', and Ch. 7 'Probabilistic Causality'.

***Further Reading*:**

C. Hitchcock: 'Probabilistic Causation', in the **SEP**: <http://plato.stanford.edu/entries/causation-probabilistic/>, esp. sections 1&2.

Class 4: Counterfactual Theories of Causation

D. Lewis: 'Causation' in **LP2**, pp. 159-172. Also read Postscript B 'Chancy Causation' (pp. 175-184 of **LP2**).

***Further Reading*:**

PCE, Ch. 3.

P. Menzies, 'Counterfactual Theories of Causation', in **SEP**: <http://plato.stanford.edu/entries/causation-counterfactual/>

Class 5: Counterfactual Semantics

D. Lewis: 'Counterfactual Dependence and Time's Arrow', in **LP2**, pp. 32-52. Also read Postscript B 'Big and Little Miracles' (pp. 55-56 of **LP2**) and Postscript D 'The Indeterministic Case' (pp. 58-65 of **LP2**).

Further Reading:

A. Elga: 'Statistical Mechanics and the Asymmetry of Counterfactual Dependence', *Philosophy of Science*, Vol. 68, pp. S313-S324.

Class 6: A Critique of the Regularity Theory of Laws

ALN, Part 1.

Further Reading:

PCE, Ch. 5.

J. W. Carroll: 'Laws of Nature', in **SEP**: <http://plato.stanford.edu/entries/laws-of-nature/>. Read overview and Section 1.

Class 7: Laws of Nature as Relations Between Universals

ALN, Part 2; Chapters 6-8.

Further Reading:

PCE, Ch. 6.

J. W. Carroll: 'Laws of Nature', in **SEP**: <http://plato.stanford.edu/entries/laws-of-nature/>. Read Section 3.

Class 8: Armstrong's View of Probabilistic Laws & Further Considerations

ALN, Part 2; Chapters 9-11.

Class 9: The *Role* of Chance in Guiding Credence

D. Lewis: 'A Subjectivist's Guide to Objective Chance' in **LP2**, pp. 83-114.

Class 10: The Best System Analysis of Laws and Chance

B. McLaughlin and K. Bennett: 'Supervenience' in **SEP:** <http://plato.stanford.edu/entries/supervenience/>. Read Overview and Introduction.

And

PP2, Introduction.

And

D. Lewis: 'Humean Supervenience Debugged', *Mind*, Vol. 103, pp. 473-490.

Further Reading:

J. W. Carroll: 'Laws of Nature', in **SEP**: <http://plato.stanford.edu/entries/laws-of-nature/>. Read sections 2&4.

Class 11: Are There Special Science Laws?

J. Fodor (1974): 'Special Sciences (or: The Disunity of Science as a Working Hypothesis) ', *Synthese*, **28**, pp. 77-115.

***Further Reading*:**

J. Kim (1992): 'Multiple Realization and the Metaphysics of Reduction', *Philosophy and Phenomenological Research*, **52**, pp. 1-26.

J. Fodor (1997): 'Special Sciences: Still Autonomous After All These Years', *Noûs*, **31**, pp. 149-63.

J. W. Carroll: 'Laws of Nature', in **SEP**: <http://plato.stanford.edu/entries/laws-of-nature/>. Read section 9.

Class 12: *Ceteris Paribus* Laws

M. Lange: 'Who's Afraid of *Ceteris Paribus* Laws? Or: How I Learned to Stop Worrying and Love Them', *Erkenntnis*, Vol. 67 (2002), pp. 157-172.

Further Reading:

PCE, Ch. 7.

A. Reutlinger *et al.* '*Ceteris Paribus* Laws', in **SEP:** <http://plato.stanford.edu/entries/ceteris-paribus/>.

Class 13: Does Physics Discover Causes?

C. Hitchcock: 'What Russell Got Right', in Price, H. and Corry, R. (eds.) (2007): *Causation, Physics, and the Constitution of Reality: Russell's Republic Revisited* (Oxford: Clarendon Press), pp. 45-65.

Further Reading:

B. Russell (1913): 'On the Notion of Cause', *Proceedings of the Aristotelian Society*, **13**, pp. 1-26.

Class 14: Does Physics Provide Causal Asymmetry?

ATC, Chs 1&2.

And

H. Field (2003): 'Causation in a Physical World', in M. Loux and D. Zimmerman (eds.): *Oxford Handbook of Metaphysics* (Oxford: OUP), pp. 435-38.

Further Reading:

H. Field (2003): 'Causation in a Physical World', in M. Loux and D. Zimmerman (eds.): *Oxford Handbook of Metaphysics* (Oxford: OUP), pp. 439-60.

Class 15: Chance in Classical Statistical Mechanics

ATC, Chs. 3&4.

Class 16: Determinism and Chance

B. Loewer: 'Determinism and Chance', *Studies in the History and Philosophy of Modern Physics*, Vol. 32 (2001), pp. 609-620.

ATC, Ch. 5.

Further Reading:

J. Schaffer (2007): 'Deterministic Chance?', *British Journal for the Philosophy of Science*, **58**, pp. 113-40.

L. Glynn (2010): 'Deterministic Chance', *British Journal for the Philosophy of Science*, **61**, pp. 51-80.

Class 17: Quantum Statistical Mechanics

ATC, Ch. 7.

Class 18: Is There Causation in the Special Sciences?

L. Glynn: 'Is There High-Level Causation?' <http://tinyurl.com/6s8x4yh>.