

Parsimony -- Philosophy 920 – Spring 2011

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This course will mainly consider parsimony arguments in science, though there will be some attention to parsimony arguments in philosophy. We will look at scientific case studies and also at how parsimony arguments get represented within different broad theories of scientific reasoning. The case studies will include C. Lloyd Morgan's canon (roughly, the idea that you should explain an organism's behavior by attributing to it only the most rudimentary mental abilities that are needed to explain the observations), the use of parsimony in evolutionary theory to infer phylogenetic relationships, and Copernican versus Ptolemaic astronomy. We will consider Bayesian and Popperian ideas about parsimony, and also the role of parsimony in frequentist statistics (especially in model selection theory). We will discuss Ockham's razor, Newton's ideas on parsimony in the Rules of Reasoning in Philosophy that he states in *Principia*, and Aristotle's principle that "nature does nothing in vain." The philosophical uses of parsimony that we'll consider will include arguments against ethical realism in metaethics.

Requirements: You should attend all meetings of the seminar and participate in discussion. Three papers are required: a short (5 page double-spaced) paper by the 6th seminar meeting, another such by the 10th, and a term paper (15-20 pages) by the end of the semester. Each short paper should be on one or two points you want to criticize in one of the readings; you must hand in your paper on reading x before the session of the seminar occurs at which x is discussed. You should discuss your plans for your term paper with me before week 12.

Weeks 1-2. Introduction

Hans Reichenbach, "Two Kinds of Simplicity," In *Experience and Prediction*, U of Chicago Press, 1938, pp. 373-87.

Harold Jeffreys, *Scientific Inference*, Cambridge UP, 3rd edition, 1973, pp. 34-39, 61-64.

Karl Popper, "Simplicity," ch. 7 of *Logic of Scientific Discovery*, Hutchinson, 1959, pp. 136-145.

Nelson Goodman, "Safety Strength, Simplicity," in *Problems and Projects*, Bobbs-Merrill, pp. 334-336.

W.V. Quine, "Simple Theories of a Complex World," in *Ways of Paradox*, Random House, 1966.

Robert Nozick, "Simplicity as Fall Out," in *Socratic Puzzles*, Harvard UP, 1997, pp.182-190.

Week 3. Parsimony in Early Modern Philosophy (organized and led by Eric Stencil)

a. Descartes against the Scholastics and Descartes' derivation of the Laws of Motion. Descartes: *The World* chapters 2 and 5; *Principles of Philosophy*, Part II articles 4, 36-37, 39,42; Part IV 203-206; Letter to Huygens October 10, 1642. Arnauld: *On True and False Ideas* Chapter 1. Daniel Garber: *Descartes Metaphysical Physics* chapter 4, pp. 94-96 and 103-111.

b. Malebranche and God's Simple Ways. Malebranche: *Treatise on Nature and Grace* Discourse 1, XII-XV, VII-XIX and First Elucidation III. Steve Nadler: "Tanges montes et fumigabunt" section I.

c. Leibniz and Parsimony. Leibniz: *Discourse on Metaphysics 1-7*. Donald Rutherford: "Nature, Laws, and Miracles" section III. Leibniz, on architectonic reasoning in physics, *Philosophical Papers and Letters* (vol. 2), translated by L. Loemker, 1956, pp. 777-83, 785-88. See also the Wikipedia articles on Snell's Law and Fermat's Law.

d. Berkeley, Locke and Immaterialism. Berkeley: *A Treatise Concerning the Principles of Human Knowledge*, Articles 18-20, 50. Urmson; *Berkeley* chapter 2, esp. 'The Superfluity of Matter' pp. 114-116.

Week 4. Some History of "Ockham's Razor" and a little bit on parsimony in the Scientific Revolution

W.M. Thorburn, "The Myth of Ockham's Razor," *Mind*, 1918, 107: 345-353.

Roger Ariew, "Ockham's Razor," 1976, University of Illinois – Urbana-Champaign Ph.D. dissertation, chs. 1-3.

J.S. Mill, *An Examination of Sir William Hamilton's Philosophy*, Chapter XXIV, "Of Some Natural Prejudices Countenanced by Sir William Hamilton, and Some Fallacies Which He Considers Insoluble"

Isaac Newton, "Rules of Reasoning in Philosophy," *Principia*. <http://gravitee.tripod.com/rules.htm> .
Isaac Newton, *Treatise on Revelation* (unpublished), section 1.1, "Rules for interpreting the words and language in Scripture," Rule 9:
<http://www.newtonproject.sussex.ac.uk/view/texts/normalized/THEM00135>

On heliocentric versus geocentric astronomy: Wayne Myrvold, "A Bayesian Account of the Virtue of Unification," *Philosophy of Science*, 2003, 70: 399-423. [read just pages 399-406 for now]; Marc Lange, "Spearman's Principle" *Brit. J. Phil. Sci.* 46 (1995), 503-521. [read just pages 503-507 for now].

Week 5. Some Probability Tools (Bayesianism and Likelihoodism)

E. Sober, *Evidence and Evolution*, ch. 1, pp 1-48.

C. Howson, "On the Consistency of Jeffreys' Simplicity Postulate and its Role in Bayesian Inference." *Phil. Quart.*, 1988, 38: 68-83.

Week 6. Parsimony, Likelihood, and Common Cause versus Separate Cause Explanations

On Reichenbach's proof that there is a model that postulates a common cause for two or more effects that entails that the effects are positively correlated: Elliott Sober, *Reconstructing the Past*, MIT Press, 1988, pp. 78-81. Also see the handout "What Reichenbach Proved about Common Causes" on my web site.

Adapting Reichenbach's idea to a likelihood comparison of common cause and separate cause explanations (both pertaining to token events): E. Sober, *E&E*, pp. 275-283, 293-4.

Christopher Hitchcock, "The Common Cause Principle in Historical Linguistics," *Philosophy of Science* 1998, 65: 425-447.

Alan Baker, "Occam's Razor in Science – a Case Study from Biogeography," *Biology and Philosophy*, 2007, 22: 193-215.

Week 7. Parsimony, Likelihood, and Inferring the State of an Assumed Common (Token) Cause

E. Sober, *Did Darwin write the Origin Backwards?* Sections 1.6 and 5.1. Prometheus Books, 2011.

Wayne Maddison (1991): "Squared-Change Parsimony Reconstructions of Ancestral States for Continuous-Valued Characters on a Phylogenetic Tree." *Systematic Zoology* 40: 304-314.

Week 8-9. Parsimony in Comparative Psychology – Morgan's Canon and the Principle of Conservatism (* = assigned reading).

*E. Sober, "Morgan's Canon." In C. Allen and D. Cummins (eds.), *The Evolution of Mind*, Oxford University Press, 1998, pp.224-242.

*Karin-D'Arcy, M. R. (2005), "The Modern Role of Morgan's Canon in Comparative Psychology." *International Journal of Comparative Psychology*, 18, 179-201.

*Simon Fitzpatrick, "The Primate Mindreading Controversy: A Case Study in Simplicity and Methodology in Animal Psychology." In Robert Lurz (ed.), *The Philosophy of Animal Minds*. Cambridge University Press, 2009, pp. 258-277.

*Daniel Dennett, "Skinner Skinned." *Brainstorms*. 1978.

Povinelli, D. and Vonk, J. (2003): "Chimpanzee Minds: Suspiciously Human?" *Trends in Cognitive Science*, 7: 157-160.

Povinelli, D. J. & Vonk, J. (2004): "We don't need a microscope to explore the chimpanzee's mind. *Mind Lang.* 19, 1–28.

Derek C. Penn and Daniel J. Povinelli (2007): "On the lack of evidence that non-human animals possess anything remotely resembling a 'theory of mind'." *Phil. Transactions of the Royal Society B* 362:731-44.

Tomasello, M. & Call, J. (2006): "Do chimpanzees know what others see—or only what they are looking at? In *Rational animals?* (eds. S. Hurley & M. Nudds), pp. 371–384. Oxford, UK: Oxford University Press.

Robert Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior*. University of Chicago Press, 1987, pp. 375-403.

Dennett, D. (1987). *The Intentional Stance*. Cambridge, MA: MIT Press.

Dennett, D. (1991). "Real Patterns." *Journal of Philosophy*, 88, 27-51.

Heyes, C.M. (1998). "Theory of mind in non-human primates." *Behavioral and Brain Sciences*, 21, 101-148.

Andrew Whiten (1996):, "When does Smart Behavior-Reading become Mind-Reading?" In P. Carruthers and P. Smith (eds.), *Theories of Theories of Mind*, Cambridge U Press, pp. 277-292.

Simon Fitzpatrick, "Doing away with Morgan's Canon." *Mind and Language* 23: 224-246.

Weeks 9-10. Parsimony and Model Selection

E. Sober, *Evidence and Evolution*, ch 1.7-1.8, ch 3.7.

E. Sober, "Parsimony and Models of Animal Minds." In Robert Lurz (ed.), *The Philosophy of Animal Minds*. Cambridge University Press, 2009, pp. 237-257.

Week 10-11. Bayesian Unification and Spearman's Principle

Wayne Myrvold, "A Bayesian Account of the Virtue of Unification," *Philosophy of Science*, 2003, 70: 399-423.

Marc Lange, "Bayesianism and Unification: A Reply to Wayne Myrvold." *Philosophy of Science*, 71: 205-215.

Marc Lange, "Spearman's Principle" *Brit. J. Phil. Sci.* 46 (1995), 503-521.

Week 11-12. Parsimony, Likelihood, and Inferring Phylogenetic Trees

David Baum and Stacey Smith, *Tree-Thinking: An Introduction to Phylogenetic Biology*, unpublished manuscript available at Social Science Copy Center under Botany 563, selections from chapters 4 and 7.

Sober, E&E, section 4.8.

Mark Holder, Paul Lewis, and David Swofford, "The Akaike Information Criterion Will Not Choose the No Common Mechanism Model." *Syst. Biol.* 59(4):477-485, 2010.

Week 13. Parsimony in Modern Philosophical Arguments

M. Huemer, "When is Parsimony a Virtue?" *Phil. Quarterly*, 2009, 59: 216-236.

E. Sober, "Parsimony Arguments in Science and Philosophy — A Test Case for Naturalism," *Proceedings and Addresses of the American Philosophical Association*, 2009, 83:2, pp. 117-155.

Week 14. Ockham's Razor as a Pragmatic Principle

Kevin Kelly and Clark Glymour, "Why Probability Doesn't Capture the Logic of Scientific Justification." In C. Hitchcock (ed.), *Contemporary Debates in the Philosophy of Science*. Blackwell, 2004, pp. 94-114.

Week 15. Aristotle on "Nature does Nothing in Vain" (organized and led by Paula Gottlieb)

James Lennox, "Nature does nothing in vain" in his *Aristotle's Philosophy of Biology*. Cambridge UP, 2001, pp.205-224.

David Sedley, *Creationism and its Critics in Antiquity*, U Cal Press, 2009, ch. 6, pp. 167-204 (esp section 5).

Monte Johnson, *Aristotle on Teleology*, Oxford, 2008, pp. 80-82, 229-37, and 278-294.

Week 16. Wrap Up