

PHIL 244 – Philosophy and the Natural Sciences

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Synopsis

An introduction to central issues in the philosophy of science through the study of its recent history. By progressing from the logical positivists to contemporary theorists, we will examine how our understanding of the nature of scientific theories has developed through the 20th century. Topics will include the nature of scientific explanation, evidence, inductive reasoning, paradigm shifts, and evolutionary biology. Topics in Evolutionary biology include Darwinism, Fitness, Selection, Adaptationism, Laws, Essentialism, Population Thinking, Species, Race, and Evolutionary Ethics. Readings will include Appiah, Ayer, Dawkins, Goodman, Hempel, Kitcher, Kuhn, Laudan, Mayr, Popper, Schlick, Sober, and others.

Grading

80% of your grade will come from four 3-4 page papers (weighted evenly). Papers will be graded on the grounds of ability to clearly explain the material you are writing about and original argumentation. Original argumentation will be evaluated in terms of its existence (is there any?) and plausibility (how well does it stand up to criticism?). I encourage you to take risks within reason. Don't think you can come up with a new theory of evolution in 2-3 pages, but do try to critique arguments, and propose solutions to smaller problems. (I take grading papers to be something like scoring diving: both the difficulty of the project and the quality of the execution are taken into account).

20% of your grade will come from class participation. Participation will be determined by attendance, preparedness (having read the assigned readings before class with questions in mind), discussion, and 2 five-minute presentations. The presentations will take the form of a brief summary of the central arguments of a reading, the main points of our discussion and any lingering concerns you had about the readings or our discussions. These presentations will be at the beginning of class and will be on the class after the discussion of the assigned reading was completed. For instance, if we finish reading and discussing Hume's old riddle of induction on Monday, the presenter will give a brief presentation at the start of class on Wednesday. If you miss a class you should always contact me to see what you missed and what the next assignment is.

Office Hours

You are highly encouraged to come to office hours to discuss anything. You are especially encouraged to come to office hours if you have missed a class, are having problems with the course material (some of which is very difficult), or working on a paper. I am also available for office hours by appointment but I request that you give me at least 24 hours notice for this. If our schedules conflict too much I can also meet with you over Skype.

Readings

I should say that we probably will not get through all of the material below. Pace will be largely set by class discussion and interest. I'll reserve the right to replace a reading with a similar one if I

think it will better facilitate class discussion or student interest. There are two required books for this course:

Hempel, C. 1966. *Philosophy of Natural Science*. Prentice-Hall, Inc.

Sober, E. (Ed.) (2006). *Conceptual Issues in Evolutionary Biology*. 3rd Edition (CIEB)

Class Schedule

Part I: General Philosophy of Science

Section I. Empiricism and Scientific Theory

Introduction to Scientific Inquiry

Hempel, C. 1966. *Philosophy of Natural Science*. Chps. 1-2

Logical Positivism

Schlick "Positivism and Realism"

Hypothesis and Theories

Hempel, C. 1966. *Philosophy of Natural Science*. Chps. 3,6

Concepts

Hempel, C. 1966. *Philosophy of Natural Science*. Chps. 7

Section II The Old and New Riddles of Induction.

The Old Riddle of Induction

Hume *Enquiry* Sects. IV-VI, IX-XI

Russell, B. 1912. "On Induction". in *Problems of Philosophy*. Oxford: Home University Library.

Confirmation and the Ravens Problem

Hempel, C. 1945. Studies in the Logic of Confirmation (I). in *Mind*. 54:214. 1-26.

The New Riddle of Induction

Goodman, N. "The New Riddle of Induction." *Fact, Fiction, Forecast*. 59-83.

Section III - Karl Popper

Popper on Falsification

Popper, K. 1959. *The Logic of Scientific Discovery*. Chap 5*

Popper on Confirmation

Popper, K. 1959. *The Logic of Scientific Discovery*. Chp10*

Optional: The two chapters above are difficult. It may help to get an overview of his work on these issues from his 1953 lecture "Science: Conjectures and Refutations".

Godfrey-Smith, P. (2007). Popper's Philosophy of Science: Looking Ahead.

Forthcoming in J. Shearmur and G. Stokes (eds.), *The Cambridge Companion to Popper*.

Section IV Kuhn on the nature of Scientific Revolutions.

Kuhn on Science and Paradigms

Kuhn, T. 1962. *The Structure of Scientific Revolutions*. Selections. Reprinted in *Science, Reason and Reality*. Daniel Rothbard (Ed.) Harcourt Brace: New York. 237-59.

What Happened After *Structure*?

Laudan, L. 1977. "Dissecting the Holist Picture of Scientific Change." 274-99.
Reprinted in *Science, Reason and Reality*. Daniel Rothbard (Ed.) Harcourt Brace: New York.

Section V Feminism in Philosophy of Science (aka 'Females in the Evolutionary Process')

Women in the Evolutionary Process

Hrdy, S. 1986. "Empathy, Polyandry, and the Myth of the Coy Female" in *Conceptual Issues in Evolutionary Biology*. 3rd Ed. (Elliot Sober, Ed.)

Lloyd, E. 1993. "Pre-theoretical Assumptions in Evolutionary Explanations of Female Sexuality". in *Conceptual Issues in Evolutionary Biology*. 3rd Ed. (Elliot Sober, Ed.)

Section VI Science Studies and Alan Sokal

Relativism in the Sciences

Sokal, A. 1996. "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity". In *Social Text*. 46/47: 217-252 (Just read the first 11 pages)

Sokal, A. 1996. "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity (An Afterward)". In *Dissent*. 43(4): 93-99.

Bogghosian, P. 1996. "What Sokal Ought to Teach Us." *Times Literary Supplement* (12/13/96): 14-15.

Part II: Philosophy of Evolutionary Biology

Section I: Evolution

Sterelny, K. and Griffiths, P. 1999. "The Received View of Evolution" in *Sex and Death*. Chicago: University of Chicago Press. 22-52.

Godfrey-Smith, P. 2007. Conditions for Evolution by Natural Selection. *Journal of Philosophy*. 104: 489-516.

Section II: Further Issues in Evolutionary Theory: Fitness, Selection,

Fitness

Sober, E. 2001. "The Two Faces of Fitness" in CIEB.*

Selection

Williams, G. C. 1966. *Adaptation and Natural Selection*. excerpts in CIEB.

Wilson, D. 1989. "Levels of Selection: An Alternative to Individualism in Biology and the Human Sciences." in CIEB*

Non-adaptationism and Adaptationism

Gould, S. and Lewontin R. 1979. "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Program" in CIEB.

Godfrey-Smith, P. 2001. "Three Kinds of Adaptationism" in S. H. Orzack & E. Sober (eds.), *Adaptationism and Optimality*, Cambridge University Press.

Section III: Evolutionary Psychology, Essentialism, and Populations

Evolutionary Psychology

Tooby, J. and Cosmides, L. 2000. "Toward Mapping the Evolved Functional Organization of Mind and Brain" in CIEB.

Buller, D. 2000. "Evolutionary Psychology: A Critique" in CIEB.

Essentialism and Populations

Mayr, E. 1975. "Typological versus Population Thinking" in CIEB.

Section IV: Species and Race

Species

Hull, D. 1978. "A Matter of Individuality" in CIEB.

Baum, D. and Donoghue, M. 1995. "Choosing Among Alternative "Phylogenetic" Species Concepts." in CIEB.

Race

Dawkins, R. 2004. *The Ancestor's Tale*. Rendezvous 26 Protostomes: The Grasshopper's Tale: 397-414.

Appiah, K. 1996. "Why There Are No Human Races" in CIEB.

Andreasen, R. 1998. "A New Perspective on the Race Debate" in CIEB.

Section V: Further Extensions of Evolutionary Biology

Sociobiology and Ethics

Ruse, M. and Wilson, E. 1986. "Moral Philosophy as Applied Science" in CIEB.

Kitcher, P. 1993. "Four Ways of "Biologizing" Ethics." in CIEB.