

PHIL404: Scientific Explanation

Fall 2006

MWF 1:00–1:50: 100 SH

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Office Hours: Tuesdays 1-3pm

Course Description

This course will introduce the rich literature on scientific explanation. We will begin with Positivist accounts of scientific explanation, and then continue on to causal, pragmatic, and unification theories of explanation. Along the way, we will consider what makes for a good scientific explanation, whether there is a difference between prediction and explanation, and the difference between explaining events and explaining laws. We will conclude with a survey of literature on the related problems of reductive and functional explanation in the special sciences.

Prerequisites

The material we will be reading will presuppose a working knowledge of symbolic logic. If you have not taken at least one course in logic at the level of PHIL102 or higher, please let me know immediately.

Texts

All course texts will be on reserve. Two readers on reserve at Daley Library will be especially heavily used: JC Pitt's *Theories of Explanation* and Minnesota Studies in the Philosophy of Science v13, edited by Kitcher and Salmon. Readings found in these will be marked below with [JP] and [KS] respectively. Other reserve books and articles will be marked either with [R] for books on two-hour reserve at Daley Library or with [ER] for item on electronic reserve.

Course Mechanics and Grading

- *Participation* I will expect you to have done the reading for each class, and to come prepared to take an active part in the discussion. Dates for which there are no specific readings assigned are reserved for discussion. Preparation and participation together will count for 25% of your final grade.
- A *Take-Home Midterm* essay exam. The exam will be given out in class on 10/13 and due one week later. The midterm will be worth 30% of your final grade.
- An *Outline* for your final paper, due three weeks before the final paper is due, worth 10% of your final grade

- A *Final Paper* of 3,500-4,500 words, worth 35% of your final grade.

Details about the midterm and final will be forthcoming.

Additional Course Information

- As always, the readings for this course will be difficult, requiring close study and multiple readings. The best approach is to read each piece both before and after we discuss it in class. Reread each piece several times if necessary.
- Under some circumstances, extensions on assignments may be granted, but arrangements for an extension must be made with me at least two days prior to an assignment's due date. Late assignments turned in absent such arrangements will be downgraded by 1/3 letter grade per day.
- Students with disabilities who require accommodations for access and participation in this course must be registered with the Office of Disability Services (ODS). Please contact ODS at 312/413-2183 (voice) or 312/413-0123 (TTY). If you have a disability, please notify me and the appropriate administrative offices at the beginning of the semester so that we can make accommodations for you. We will be happy to do so.

Tentative Schedule of Lecture and Readings

Topic One: Introduction & Deductive Theories

Week 1 *Introduction*

8/28 First meeting.

8/30 Chapter 2 of Ernest Nagel *The Structure of Science* [R]

9/1 Hempel and Oppenheim "Studies in the Logic of Explanation" & "Postscript" (in Hempel *Aspects of Scientific Explanation* [R])

Week 2 *D-N Explanation Continued*

Optional: Salmon 'Introduction' and 'First Decade' [KS]

9/4 *No Class-Labor Day*

9/6 Carl Hempel "Aspects of Scientific Explanation" Part 1&2: 'Introduction' and 'Deductive-Nomological Explanation': 333-375 in *Aspects of Scientific Explanation* [R]

9/8 Hempel "Aspects of Scientific Explanation" Part 3 : 'Statistical Explanation': 376-411 in *Aspects* [R]

Week 3 *D-N Broader Background and Extensions*

- 9/11 Carl Hempel “Aspects of Scientific Explanation” Part 4&5: ‘The concepts of Covering-Law models as Explicatory Model’ and ‘Pragmatic Aspects of Explanation’: 412–432 in *Aspects* [R]
9/13 (Discussion: Prepare by reading at least one of parts 6-10 of *Aspects*)
9/15 Railton “A Deductive-Nomological Model of Probabilistic Explanation” [JP]

Week 4 *Problems with Deductivism*

Optional: Salmon ‘Second Decade’ [KS]

- 9/18 Salmon “Deductivism Visited and Revisited”, Essay 9 in *Causality and Explanation* [R]
9/20 Scriven, “Explanations, Predictions, and Laws” [JP]

Topic Two: Ontic Theories

Week 5 *Causal theories*

Optional: Salmon ‘Third Decade’ [KS]

- 9/25 David Lewis “Causal Explanation” in *Philosophical Papers* v2 [R]
9/27 Paul W Humphreys “Scientific Explanation: The Causes, Some of the Causes, and Nothing But the Causes” p283-306 [KS]

Week 6 *Critiques of Causal theories*

- 10/2 James Woodward “The Causal Mechanical Model of Explanation” p357-383 [KS]
10/4 Hitchcock, Christopher, “Discussion: Salmon on Explanatory Relevance.”, *Philosophy of Science* (1995) 62: 304-20. [ER]
10/6 Salmon, Wesley “Causality and Explanation: A Reply to Two Critiques”, *Philosophy of Science*, (1997) 64: 461-477.[ER]

Week 7 *Extension: Woodward and Manipulability*

- 10/9 §1-7 of Woodward, James. “Explanation and Invariance in the Special Sciences”. *British Journal for the Philosophy of Science*. 51 (2000), 197-254. [ER]
10/11 §8-14 of Woodward “Explanation and Invariance...” [ER]
10/13 **Midterm handed out in Class**

Topic Three: Epistemic Theories

Week 8 *van Fraassen*

- 10/16 van Fraassen, Chapter 5 of *The Scientific Image* [R]
10/18 van Fraassen, cont. Also read:
Salmon and Kitcher “van Fraassen on Explanation”, essay 11 in Salmon *Causality and Explanation* [R]
10/20 **Midterm due by the beginning of class**

Week 9 *Unification: Friedman and Kitcher*

- 10/23 Michael Friedman "Explanation and Scientific Understanding": 188-198 [JP]
Philip Kitcher, "Explanation, Conjunction, and Unification" *The Journal of Philosophy* 73(8) (1976): 207-212. [ER]
- 10/25 Philip Kitcher "Explanatory Unification": 167-187 [JP]
- 10/27 Kitcher, con't.
Optional: Kitcher's "Explanatory Unification and the Causal Structure of the World": 410-506 [KS].

Week 10

- 10/30 Michael Strevens "The Causal and Unification Approaches to Explanation Unified-Causally" *Noûs* (2004) 38:1 : 154-176 [ER]
- 11/3 *No Class*

Topic Four: Reduction and Function

Week 11 *Reduction and the Unity of Science*

- 11/6 Ernest Nagel, First half of Chapter 11: 336-365 in *The Structure of Science* [R]
- 11/8 Oppenheim and Putnam "Unity of Science as a Working Hypothesis" [R]

Week 12 *Critiques of reduction*

- 11/13 Jerry Fodor "Special Sciences, or the Disunity of Science as a Working Hypothesis" *Synthese* 28 (1974): 97-115 [ER]
- 11/15 Philip Kitcher "1953 And All That: A Tale of Two Sciences" *Philosophical Review* 93 (1984): 335-73 [ER]
- 11/17 Lawrence Sklar, Chapter 9 of *Physics and Chance* [R]
Outlines for final paper due

Week 13 *Reduction, Composition, and Mechanism*

- 11/20 Ernest Nagel, Second Half of Chapter 11: 366-397 in *The Structure of Science* [R]
Outlines for Final Paper Due
- 11/22 Nagel, con't.
- 11/24 *No Class—Thanksgiving Break*

Week 14 *Function and Mechanism*

- 11/27 Machamer, Darden and Craver "Thinking about Mechanisms", *Philosophy of Science* 67 (2000):1-25. [ER].
- 11/29 Chapters 1 and 2 of Robert Cummins, *The Nature of Psychological Explanation* [R]
- 12/1 Cummins, con't.

Week 15 *Reduction: Final Thoughts*

- 12/4 Wimsatt "Reductionism, levels of organization, and the mind-body problem" (1976) In *Consciousness and the Brain: A Philosophical Investigation*: 205-267 [R]
- 12/6 Wimsatt, Con't.
- 12/11 *Final papers due first day of exam period*