

Scientific Explanation

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Office Hours: by appointment

Class Hours: Thursday 2.15-3.45pm

Class Room: B410

Course Description

The aim of this course is to familiarize you with central issues in scientific explanation from the mid 20th century until today. Going through accounts of scientific explanation will give us the opportunity to touch upon a series of major themes in the philosophy of science, such as laws of nature, probability, causality, realism, empiricism, and scientific practice. The seminar shall provide understanding for contemporary issues of scientific explanation. These include the debate on non-causal explanation, explanation and representation, and scientific understanding.

Access to Course Material and Communication

Hard copies of all texts on the syllabus (Handapparat) are accessible in the library of the Institute of Philosophy. PDFs will be provided via Stud.IP if Copyright restrictions permit. Please sign up for the course on Stud.IP.

Participation, 'Studienleistung', and Exam

Active **participation** is required from all who want to take part in the course. This includes presence at all sessions as well as thorough reading of the core readings and handouts. Presence at all sessions is not a formal requirement but regular participation is essential for your personal learning experience since the later sessions build on contents of the preceding sessions. Core readings (c_i) are indicated on the course plan. The core readings will be at the centre of our seminar discussions. The course plan also lists additional readings (a). These readings provide an additional (and often critical) perspective with direct reference to the respective core readings. Preparation of the additional readings is **not** required.

In order to pass the course ('**Studienleistung**') you need to prepare four handouts. A handout summarizes the main line of argument of the core readings on 1-2 pages and includes at least three questions regarding the core readings. The deadline for submitting handouts is Tuesday evening 6pm (two days before the corresponding session). Late submissions will not be accepted. The handouts will be circulated on Wednesday such that all participants can read them before the meeting on Thursday. The handouts will be incorporated into the seminar discussion. An exemplary handout will be shown during the first session. Please sign up for handouts during the second session (01.11.2018).

Exams are either oral exams or essays. Oral exams (BA: 20 min., MA: 30 min.) will be based on 1-2 texts of your choice from the syllabus (core and additional readings). An essay (BA: 10-12 pages, MA: 20 pages) is on a topic of your choice that is related to scientific explanation. If you want to take an oral exam or write an essay, please contact me.

Course Plan

This is a preliminary course plan. The c_i indicate mandatory core readings, the a_i are additional readings which are optional.

25.10.2018 Introduction

01.11.2018 The DN-Model of Scientific Explanation

c: Hempel and Oppenheim 1948 "Studies in the Logic of Explanation", Parts I and III

08.11.2018 Statistical Explanation I

c: Hempel 1965 "Aspects of Scientific Explanation", pp. 381-83 and 394-403

a: Coffa 1974 "Hempel's Ambiguity"

15.11.2018 Statistical Explanation II

c: Salmon 1971 "Statistical Explanation", Parts 1-5 and 7-10

22.11.2018 Causal Explanation I

c: Cartwright 1979 "Causal Laws and Effective Strategies"

29.11.2018 Causal Explanation II

c: Salmon 1984 "Scientific Explanation and the Causal Structure of the World", Chapter 5 "Causal Connection"

a: Salmon 1984 "Scientific Explanation and the Causal Structure of the World", from "Three Conceptions Revisited" pp. 124-134

06.12.2018 Explanation through Unification

c: Kitcher 1981 "Explanatory Unification"

13.12.2018 Scientific Understanding

c: de Regt and Dieks 2005 "A Contextual Approach to Scientific Understanding" (as preparation for de Regt's colloquium talk on 18.12., 4-6 pm, B313)

20.12.2018 The Pragmatics of Explanation

c: van Fraassen 1980 "The Scientific Image", from "The Pragmatics of Explanation" §§3-5 (pp.130-157)

a: Kitcher and Salmon 1987 "Van Fraassen on Explanation"

10.01.2018 Interventionist Causation and Explanation

- c*: Woodward and Hitchcock 2003 "Explanatory Generalizations, Part I: A Counterfactual Account"
- a*: Woodward and Hitchcock 2003 "Explanatory Generalizations, Part II: Plumbing Explanatory Depth"

17.01.2019 Mechanistic Explanation

- c*: Machamer, Darden, and Craver 2000 "Thinking about Mechanisms"

25.01.2018 Non-causal Explanation ¹

- c*: Lange 2013 "What Makes a Scientific Explanation Distinctively Mathematical?"
- a*: Strevens 2018 "The Mathematical Route to Causal Understanding"

31.01.2019 Concluding Discussion

¹The session on Friday 25.01.2019, 8.15-9.45am, B313 is a substitute for the session on 24.01.2019.

References

- Cartwright, Nancy. Causal laws and effective strategies. *Noûs*, 13(4):419–437, 1979. ISSN 00294624, 14680068. URL <http://www.jstor.org/stable/2215337>.
- Coffa, J. Alberto. Hempel's ambiguity. *Synthese*, 28(2):141–163, Oct 1974. ISSN 1573-0964. doi: 10.1007/BF00485232. URL <https://doi.org/10.1007/BF00485232>.
- De Regt, Henk W. and Dieks, Dennis. A contextual approach to scientific understanding. *Synthese*, 144(1):137–170, Mar 2005. ISSN 1573-0964. doi: 10.1007/s11229-005-5000-4. URL <https://doi.org/10.1007/s11229-005-5000-4>.
- Hempel, Carl G. *Aspects of Scientific Explanation*. Free Press New York, 1965.
- Hempel, Carl G. and Oppenheim, Paul. Studies in the logic of explanation. *Philosophy of Science*, 15(2):135–175, 1948. doi: 10.1086/286983. URL <https://doi.org/10.1086/286983>.
- Hitchcock, Christopher and Woodward, James. Explanatory generalizations, part ii: Plumbing explanatory depth. *Noûs*, 37(2):181–199, 2003. ISSN 00294624, 14680068. URL <http://www.jstor.org/stable/3506081>.
- Kitcher, Philip. Explanatory unification. *Philosophy of Science*, 48(4):507–531, 1981. doi: 10.1086/289019. URL <https://doi.org/10.1086/289019>.
- Lange, Marc. What makes a scientific explanation distinctively mathematical? *The British Journal for the Philosophy of Science*, 64(3):485–511, 2013. doi: 10.1093/bjps/axs012. URL <http://dx.doi.org/10.1093/bjps/axs012>.
- Machamer, Peter, Darden, Lindley, and Craver, Carl F. Thinking about mechanisms. *Philosophy of Science*, 67(1):1–25, 2000. ISSN 00318248, 1539767X. URL <http://www.jstor.org/stable/188611>.
- Salmon, Wesley C. *Scientific Explanation and the Causal Structure of the World*. Princeton University Press, 1984.
- Salmon, Wesley C., Jeffrey, Richard C., and Greeno, James G. *Statistical Explanation*, pages 29–88. University of Pittsburgh Press, 1971. ISBN 9780822952251. URL <http://www.jstor.org/stable/j.ctt6wr9p.6>.
- Strevens, Michael. The mathematical route to causal understanding. In Reutlinger, Alexander and Saatsi, Juha, editors, *Explanation Beyond Causation*. Oxford University Press, 2018. URL <http://www.strevens.org/research/expln/gematria>.
- Van Fraassen, Bas C. *The Scientific Image*. Oxford University Press, 1980.
- Woodward, James and Hitchcock, Christopher. Explanatory generalizations, part i: A counterfactual account. *Noûs*, 37(1):1–24, 2003. ISSN 00294624, 14680068. URL <http://www.jstor.org/stable/3506202>.