

SEMINAR: SCIENTIFIC REASONING

SS 2017

Lecturer:	Radin Dardashti	Time:	12.15 - 13.45
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office hours: by appointment

Description

Scientists use a variety of methods to reason in favor or against a scientific theory. They use for instance experiments, simulations, analogue models, thought experiments, aesthetic evaluations or other non-empirical methods. In this seminar we will discuss work by philosophers of science as well as from scientists with the aim to keep the philosophical discussion as close as possible to actual scientific practice.

Programme

1. Introduction (18.04.2017)

Suggested Reading:

- Crupi, V. (2013). Confirmation. Stanford Encyclopedia of Philosophy.

2. Some Remarks on the Philosophy of Probability (Lecture) (25.0.2017)

Suggested Reading:

- Hájek, Alan (2011): “Interpretations of Probability”, The Stanford Encyclopedia of Philosophy (Winter 2012 Edition), Edward N. Zalta (ed.).
- Earman, J., & Salmon, W. C. (1992): “The Confirmation of Scientific Hypotheses”. In: Salmon et al. (Eds.), Introduction to the Philosophy of Science, Sect. 2.5 – 2.8.

3. Accounts of Confirmation I (Lecture) (02.05.2017)

Suggested Reading:

- Earman, J., & Salmon, W. C. (1992): “The Confirmation of Scientific Hypotheses”. In: Salmon et al. (Eds.), Introduction to the Philosophy of Science, Sect. 2.1 – 2.4.

4. Accounts of Confirmation II (Lecture) (09.05.2017)

Suggested Reading:

- Earman, J., & Salmon, W. C. (1992): “The Confirmation of Scientific Hypotheses”. In: Salmon et al. (Eds.), *Introduction to the Philosophy of Science*, Sect. 2.1 – 2.4.

5. Bayesian Confirmation Theory (Lecture) (09.05.2017)

Suggested Reading:

- Earman, J., & Salmon, W. C. (1992): “The Confirmation of Scientific Hypotheses”. In: Salmon et al. (Eds.), *Introduction to the Philosophy of Science*, Sect. 2.9 – 2.11.
- Hartmann, S., & Sprenger, J. (2010). *Bayesian epistemology*. *Routledge Companion to Epistemology*, 609-620.
- Hawthorne, J. (2011). Confirmation theory. *Philosophy of Statistics, Handbook of the Philosophy of Science*, 7, 333–389.

6. Experiments (16.05.2017)

Required Reading:

- Franklin, Allan and Perovic, Slobodan (2015): ”Experiment in Physics”, *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), Chapter 1 only.
- Franklin, A. (1994): “How to Avoid the Experimenters’ Regress”. *Studies in History and Philosophy of Science Part A*, 25(3), 463–491.
- Collins, H. M. (1994): “A Strong Confirmation of the Experimenters’ Regress”. *Studies in History and Philosophy of Science Part A*, 25(3), 493–503.

Suggested Reading:

- Feest, U., & Steinle, F. (2016). Experiment. In *The Oxford Handbook of Philosophy of Science*.
- Franklin, A., & Collins, H. (2016): Two kinds of case study and a new agreement. In *The Philosophy of Historical Case Studies*. Springer International Publishing, 95–121.
- Feest, U. (2016): “The Experimenters’ Regress Reconsidered: Replication, Tacit Knowledge, and the Dynamics of Knowledge Generation”. *Studies in History and Philosophy of Science Part A*, 58, 34–45.

7. Thought Experiments (23.05.2017)

Required Reading:

- Brown, James R. (2004): “Why Thought Experiments Do Transcend Empiricism”, in C. Hitchcock (ed.), *Contemporary Debates in the Philosophy of Science*, Malden, MA: Blackwell, 23–43.
- Norton, John (2004): “Why Thought Experiments Do Not Transcend Empiricism”, in C. Hitchcock (ed.), *Contemporary Debates in the Philosophy of Science*, Oxford: Blackwell, 44–66.

Suggested Reading:

- Brown, James Robert and Fehige, Yiftach (2014): “Thought Experiments”, *The Stanford Encyclopedia of Philosophy* (Summer 2017 Edition), Edward N. Zalta (ed.).

8. Simulations in Science (30.05.2017)

Required Reading:

- Winsberg, E. (2009): “A Tale of Two Methods”. *Synthese*, 169(3), 575-592.
- Frigg, R., & Reiss, J. (2009): “The Philosophy of Simulation: Hot New Issues or Same Old Stew?”. *Synthese*, 169(3), 593-613.

Suggested Reading:

- Winsberg, Eric (2015): “Computer Simulations in Science”, *The Stanford Encyclopedia of Philosophy* (Summer 2015 Edition), Edward N. Zalta (ed.).
- Winsberg, E. (2009): “Computer Simulation and the Philosophy of Science.” *Philosophy Compass*, 4(5), 835–845.

9. Analogies (13.06.2017)

Required Reading:

- Bartha, Paul (2013): ”Analogy and Analogical Reasoning”, *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), Edward N. Zalta (ed.).

Suggested Reading:

- Hesse, M.B. (1966): *Models and Analogies in Science*, Notre Dame: University of Notre Dame Press, 57–101.

10. Analogue Experiments (20.06.2017)

Required Reading:

- Dardashti, R., Thébault, K. P., & Winsberg, E. (2017): Confirmation via Analogue Simulation: What Dumb Holes Could Tell us About Gravity. *The British Journal for the Philosophy of Science*, 68 (1), 55–89.
- “The Israeli Research That’s Bringing Stephen Hawking Closer to the Nobel Prize”, Haareetz Article from 19. August 2016

Suggested Reading:

- Unruh, W. G. (2014): Has Hawking radiation been measured?. *Foundations of Physics*, 44(5), 532–545.
- Novello, M., Visser, M., & Volovik, G. E. (Eds.) (2002): *Artificial Black Holes*. World Scientific, 1–34

11. Non-empirical Theory Assessment (04.07.2017)

Required Reading:

- Dawid, R. (2013). *String Theory and the Scientific Method*. Cambridge University Press, Ch. 3.

Suggested Reading:

- Dawid, Richard (2017): “The Significance of Non-Empirical Confirmation in Fundamental Physics” (manuscript)

12. The No-Alternatives Argument (11.07.2017)

Required Reading:

- Dawid, R., Hartmann, S., & Sprenger, J. (2015): “The No Alternatives Argument”. *The British Journal for the Philosophy of Science*, 66(1), 213–234.

Suggested Reading:

- Dardashti, Radin (2017): “The No Alternatives Argument and Theories of Quantum Gravity”, manuscript.

13. Aesthetic Assessment in Science (27.06.2017)

Required Reading:

- Ivanova, M. (2017): *Aesthetic Values in Science*. *Philosophy Compass* (forthcoming).
- Dirac, P. A. M. (1963): “The Evolution of the Physicist’s Picture of Nature”. *Scientific American*, 208, 45–53.

- McAllister, J. W. (1990): “Dirac and the Aesthetic Evaluation of Theories”. *Methodology and Science*, 23(2), 87–102.

Suggested Reading:

- James W. McAllister (1999): *Beauty and Revolution in Science*. Cornell University Press, Ithaca and London.
- Davies, D. (1998). McAllister’s aesthetics in science: A critical notice. *International Studies in the Philosophy of Science*, 12(1), 25–32.
- Dirac, P. A. M. (1980): Why we believe in the Einstein theory. In *Symmetries in science* (pp. 1-11). Springer US.