

Scientific Realism and the Underdetermination Argument

*MirSaeid Mousavi Karimi**

DOI: 10.22096/ek.2021.530038.1356

[Received Date: 07/08/2019 Acceptance Date: 20/01/2020]

Abstract

One of the most influential arguments against the scientific realist's position is the Underdetermination Argument (UD) which holds that every theory has indefinitely many empirically equivalent, but logically incompatible, rivals, and hence there is no rational epistemic basis for believing any theory to be true. In this paper, after explaining some general points about and presumptions of UD, the most important arguments for and against UD will be discussed. Then, it is argued that a modified version of scientific realism, called "entity realism" (ER) can be immune from UD, since it is only committed to the existence of some unobservables, but is agnostic about their theoretical descriptions (whatnesses). ER, however, would be an incoherent thesis if the existence/whatness distinction, and the Existentialist's idea, according to which existence is fundamentally real, is rejected. The conclusion of this paper is that ER, supplemented with Existentialism, although is not an ideal stance, is the best secured position for scientific realists that worth fighting for.

Keywords: Scientific Realism; Scientific Antirealism; Underdetermination Argument; Entity Realism; Existence; Whatness.

* Associate Professor, Department of Philosophy, Mofid University, Qom, Iran.
Email: msmkarimi@mofidu.ac.ir



Bibliography

- Ahlström, Kristoffer (2006). "Realism and Scientific Failure", in *Essays in Honor of Professor Dag Westerståhl on his 60th Birthday*. Goteborg.
- Bangu, Sorin (2006). "Underdetermination and the Argument from Indirect Confirmation", *Ratio* (new series), Vol. 19, No. 3, pp. 269-277.
- Bergstrom, Lars (1984). "Underdetermination and Realism", *Erkenntnis* 21: 349-365.
- Bloor, D. (1991). *Knowledge and Social Imagery*. 2nd ed. Chicago: University of Chicago Press.
- Boyd, Richard (1983). "On the Current Status of Scientific Realism", *Erkenntnis*, Vol. 19, No. 1-3, pp. 45-90, reprinted in: *The Philosophy of Science*, Ed. By: R. Boyd, P. Gasper, and J. D. Trout. Cambridge, MA: The MIT Press (1999), pp. 195-222.
- Bunzl, Martin (2003). "Real World Epistemic Under-Determination", *Philosophia*, Vol. 31, No. 1-2, pp. 139-147.
- Carnap, R. (1953). "Testability and Meaning," in *Readings in the Philosophy of Science*, edited by: H. Feigl and M. Brodbeck. New York: Appleton-Century-Crofts, pp. 47-92. Reprinted from *Philosophy of Science*, Vol. 3 (1936) and Vol. 4 (1937).
- Cartwright, N. (1983). *How the Laws of Physics Lie*. Oxford: Oxford University Press.
- Churchland, P. M. (1979). *Scientific Realism and the Plasticity of Mind*, Cambridge: Cambridge University Press.
- Churchland, P. M. (1985). "The Ontological Status of Observables", in Churchland and Hooker (eds), *Images of Science*. Chicago: University of Chicago Press.
- Devitt, M. (1997). *Realism and Truth*. Princeton: Princeton University Press.
- Dickson, Michael (1999). "The Light at the End of the Tunneling: Observation and Underdetermination", *Philosophy of Science*, Vol. 66, *Supplement. Proceedings of the 1998 Biennial Meetings of the Philosophy of Science Association. Part I: Contributed Papers*. (Sep. 1999), pp. S47-S58.
- Duhem, P. ([1914]1991). *The Aim and Structure of Physical Theory* (2nd ed.) (P. Wiener, Trans.), Princeton, NJ: Princeton University Press.
- Dummett, M. (1982). "Realism", *Synthese*, Vol. 52, No.1, pp. 55-112.

- Earman, John (1993). "Underdetermination, Realism and Reason", *Midwest Studies in Philosophy*, Vol. 18, No. 1, pp. 19-38.
- Ellis, B. (1985). "What Science Aims to Do", in P. Churchland and C. Hooker (eds), *Images of Science*, Chicago: University of Chicago Press.
- Friedman, M. (1983). *Foundations of Space-Time Theories*, Princeton: Princeton University Press.
- Glymour, C. (1977). "Indistinguishable Space-Times and the Fundamental Group", In J. Earman, C. Glymour, & J. Stachel (Eds.), *Foundations of space-time theories, Minnesota studies in the philosophy of science* (Vol. VIII, pp. 50–60). Minneapolis: University of Minnesota Press.
- Glymour, C. (1984). "Explanation and Realism", in: J. Leplin (ed.), *Scientific Realism*, Berkeley: University of California Press, pp. 173-192.
- Hacking, Ian (1982). "Experimentation and Scientific Realism", *Philosophical Topics*, Vol. 13, No. 1, pp. 71–87.
- Hacking, Ian (1983). *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*. Cambridge: Cambridge University Press.
- Hanson, N.R. (1958). *Patterns of Discovery*, Cambridge: Cambridge University Press.
- Harré, R. (1986). *The Varieties of Realism: A Rationale for the Natural Sciences*, Oxford: Basil Blackwell.
- Hofer, Carl & A. Rosenberg (1994). "Empirical Equivalence, Underdetermination, and Systems of the World", *Philosophy of Science*, Vol. 61, No. 4, pp. 592-607.
- Horwich, P. (1982). "How to Choose Between Empirically Indistinguishable Theories", *The Journal of Philosophy*, Vol. 79, No. 2, pp. 61-77.
- James, W. (1948). "The Will to Believe", in: *Essays in Pragmatism*, A. Castell (Ed.), pp. 88-109. New York: Hafner Publishing Co.
- Kim, J. (1987). "Explanatory Realism, Causal Realism, and Explanatory Exclusion", *Midwest Studies in Philosophy*, Vol. 12, pp. 225-239.
- Kim, J. (1989). "Mechanism, Purpose, and Explanatory Exclusion", in: *Philosophical Perspectives*, Vol. III., Ed. J. Tomberlin. Atascadero: Calif.: Ridgeview, pp. 77-108.
- Klee, Robert (1997). *Introduction to the Philosophy of Science: Cutting Nature at Its Seams*, Oxford: Oxford University Press.

- Kukla, André (1993). "Laudan, Leplin, Empirical Equivalence and Underdetermination", *Analysis*, Vol. 53, No. 1, pp. 1-7.
- Kukla, André (1994). "Non-Empirical Theoretical Virtues and the Argument from Underdetermination", *Erkenntnis*, Vol. 41, No. 2, pp. 157-170.
- Kukla, André (1996). "Does Every Theory have Empirically Equivalent Rivals?" *Erkenntnis*, Vol. 44, No. 2, pp. 137-166.
- Laudan, Larry (1990). *Science & Relativism: Some Key Controversies in the Philosophy of Science*. Chicago: University of Chicago Press.
- Laudan, Larry & Jarrett Leplin (1991). "Empirical Equivalence and Underdetermination", *Journal of Philosophy*, Vol. 88, No. 9, pp. 449-72.
- Laudan, Larry & Jarrett Leplin (1993). "Determination Underdetermined: Reply to Kukla", *Analysis*, Vol. 53, No. 1, pp. 8-16.
- Leplin, Jarrett (1997a). *A Novel Defense of Scientific Realism*. Oxford: Oxford University Press.
- Leplin, Jarrett (1997b). "The Underdetermination of Total Theories", *Erkenntnis*, Vol. 47, No. 2, pp. 203-215.
- Leplin, Jarrett (2000). "The Epistemic Status of Auxiliary Hypotheses: A Reply to Douven", *The Philosophical Quarterly*, Vol. 50, No. 200, pp. 376-380.
- Magnus, P. D. (2005). "Peirce: Underdetermination, Agnosticism, and Related Mistakes", *Inquiry*, Vol. 48, No. 1, pp. 26 – 37.
- Malament, D. (1977). "Observationally indistinguishable space-times", In J. Earman, C. Glymour, & J. Stachel (Eds.), *Foundations of Space-Time Theories, Minnesota studies in the philosophy of science* (Vol. VIII, pp. 61–80), Minneapolis: University of Minnesota Press.
- Maxwell, G. (1962/1970). "The Ontological Status of Theoretical Entities", in: *Readings in the Philosophy of Science*, edited by Baruch A. Brody, pp. 224-233. New Jersey: Prentice-Hall Inc., reprinted from *Minnesota Studies in the Philosophy of Science*, Vol. III, edited by: H. Feigl and G Maxwell. Minneapolis: University of Minnesota Press, 1962.
- McIntyre, Lee C. (2003). "Taking Underdetermination Seriously", *Sats - Nordic Journal of Philosophy*, Vol. 4, No. 1, pp. 59-72.
- Menuge, A. (1995). "The Scope of Observation," *Philosophical Quarterly*, Vol. 45, No. 178, pp. 60-69.
- Newton-Smith, W. H. (1981). *The Rationality of Science*. Boston: Routledge & Kegan Paul Ltd.

- Norton, John D. (2003). "Must Evidence Underdetermine Theory?" [Prepared for the "First Notre Dame-Bielefeld Interdisciplinary Conference on Science and Values"]; available at: http://www.pitt.edu/~jdnorton/teaching/1702_jnrsnr_seminar/docs/underdet_thesis.pdf.
- Okasha, Samir (1997). "Laudan and Leplin on Empirical Equivalence", *Brit. J. Phil. Sci.*, Vol. 48, No. 2, pp. 251-256.
- Okasha, Samir (2002). "Underdetermination, Holism and the Theory/Data Distinction", *The Philosophical Quarterly*, Vol. 52, No. 208, pp. 303-319.
- Psillos, Stathis (1999). *Scientific Realism: How Science Tracks Truth*, London: Routledge.
- Psillos, Stathis (2000). "The Present State of the Scientific Realism Debate", *Brit. J. Phil. Sci.*, Vol. 51, No. 4, pp.705-728; available at: http://www.phs.uoa.gr/~psillos/Publications_files/REALISM-BJPS.doc
- Putnam, H. (1975). "The Refutation of Conventionalism", in: *Mind, Language and Reality, Philosophical Papers*, Vol. 2. New York: Cambridge.
- Putnam, H. (1978). *Meaning and the Moral Sciences*. Boston: Routledge & Kegan Paul.
- Putnam, H. (2000). "Pragmatic Realism", in: *Metaphysics, An Anthology*. Jaegwon Kim & Ernest Sosa, eds. Oxford: Blackwell Publishers.
- Quine, W.V.O. (1951). "Two Dogmas of Empiricism", *The Philosophical Review*, Vol. 60, No. 1, pp. 20-43.
- Quine, W. V. O. (1970). "On the Reasons for the Indeterminacy of Translation", *Journal of Philosophy*, 67, pp. 178-183.
- Quine, W.V. O. (1975). "On Empirically Equivalent Systems of the World", *Erkenntnis* 9, Vol. 9, No. 3, (Nov. 1975), pp. 313–328.
- Quine, W.V. O. (1979). "Comments on Newton-Smith", *Analysis*, Vol. 39, No.2, pp. 66-7.
- Quine, W.V. O. (1981). *Theories and Things*, Cambridge, MA: Harvard University Press.
- Salmon, W. (1985). "Empiricism: The Key Question", in: N. Rescher (ed.), *The Heritage of Logical Positivism*. Lanham: University Press of America.
- Sarkar, Husain (2000). "Empirical Equivalence and Underdetermination," *International Studies in the Philosophy of Science*, Vol. 14, No. 2, pp. 187-197.

- Stanford, P. Kyle (2001). "Refusing the Devil's Bargain: What Kind of Underdetermination Should We Take Seriously?", *Philosophy of Science*, Vol. 68, No. 3, *Supplement: Proceedings of the 2000 Biennial Meeting of the Philosophy of Science Association. Part I: Contributed Papers*, pp. S1-S12.
- Van Fraassen, B. (1980). *The Scientific Image*, Oxford: Oxford University Press.
- Van Fraassen, B. (1985). "Empiricism in Philosophy of Science," in P. M. Churchland & C. A. Hooker (eds.), *Images of Science*, Chicago, University of Chicago Press.
- van Fraassen, B. (2002). *The Empirical Stance*, New Haven: Yale University Press.
- Vogel, Jonathan (2004). "Skeptical Arguments", *Philosophical Issues, Epistemology*, Vol. 14, No. 1, pp. 426-455.
- Worrall, John (1982). "Scientific Realism and Scientific Change", *The Philosophical Quarterly*, Vol. 32, No. 128, Special Issue: Scientific Realism. (Jul., 1982), pp. 201-231.
- Worrall, John (1984). "Review: An Unreal Image," *British Journal for the Philosophy of Science*, Vol. 35, pp. 65-80.