

## Does a Context-Sensitive Model of IBE leads to Relativism? A Case in Quantum Mechanics

One of Charles Sanders Peirce most groundbreaking insight is its exposition of a specific kind of inference: abductive reasoning. Peirce's intuitions on abduction have led to significant research in contemporary philosophy of science and epistemology, notably research concerning inference to the best explanation (IBE). Our aim in this talk is to shed light on one of the most engaging challenges concerning IBE: how to assess the explanatory power of competing hypotheses? More precisely, we will look at the link between explanatory virtues and explanatory power as it is debated and discussed in contemporary literature. Our research objective is twofold: first, we will insist on one of the most important shortcomings of current approaches: the underestimation of the role played by contextual elements in abductive reasoning. Our goal will be to direct attention on the principled role context can play in IBE. Second, we will argue that this principled role played by context does not lead to a relativistic account of IBE. Our claim will be that context-sensitiveness does not give rise to relativism (neither epistemological or cognitive relativism, nor epistemic relativism).

We will first address the following questions: what does "explanatory power" stands for? How, exactly, can we assess the explanatory power of competing hypotheses? A quick review of the literature reveals that one answer is widespread: to the question "what are the criteria that discriminate that one hypothesis is a better explanation than another", most contemporary scholars answer that "explanatory virtues stand for these criteria" (Mackonis 2013: 978). Put differently, explanatory power is, in some way, *connected* to the notion of explanatory virtues<sup>1</sup>.

We will therefore clarify three notions that seem crucial for IBE: *strength*, *value*, and *power*.

*Explanatory strength*: the comparative importance of each virtue's contribution to explanatory power (e.g. evidential fit is more significant for the assessment of explanatory power than simplicity or beauty).

*Virtue score*: the *in-situ* compliance of an *actual* hypothesis to a virtue (e.g. a hypothesis ranks high in simplicity but low in unification within a *sui-generis* situation).

*Explanatory power* of a hypothesis: the overall score of the hypothesis (given by both strength and virtue score).

Our claim is that those distinctions are necessary to a correct understanding of current theories. Moreover, we will argue that they can help us explain the

---

<sup>11</sup> Other names are also used in the literature: explanatory considerations (Kuhn), theoretical virtues (Keas), and sometimes epistemic virtues, epistemic values. If not stated otherwise, we will consider all of those concepts as synonyms.

connection between explanatory virtues and explanatory power. We will insist on one strategy that have been used in the literature to help us better assess explanatory power: *systematization*. *Systematic approaches* focus on the virtues' formal strength. Proponents of systematization aim at ranking explanatory virtues through a comparative assessment of their individual explanatory significance. This talk critically engages the tendency of many IBE scholars to describe systematization in a *formal* manner. According to this formal tendency, the ultimate goal is to rank all virtue by epistemic priority independently of any *in-situ* IBE processes. Our aim will be to cast doubt on those formal approaches to explanatory strength and show that it should be understood as a contextually dependent notion.

We will argue that the upshot of this conclusion is far-reaching. We will suggest that the influence of *in-situ* factors is pervasive in IBE. Our claim is that IBE's main structural elements – such as *explanatory strength and virtue score* – need to be articulated within a context-sensitive model; an idea non-existent in pioneers like Peirce and Harman. We will argue that all models of IBE need to be flexible enough to integrate, at the heart of the model, considerations about IBE's contextual groundings.

This will lead us to ask the following question: does IBE's contextual groundings lead to a form of cognitive or epistemic relativism? So as to explore this question, we will analyze the debate about the completeness or incompleteness of quantum mechanics. Inconclusive IBE (such as it is the case in quantum mechanics theory) can occur when epistemic frameworks are not shared. When rooted in actual contexts, actual inquirers performing IBE endorse (often implicitly) epistemic framework structuring what "best explaining" means. When inquirers endorse divergent epistemic frameworks (at least frameworks that leads to divergent ranking of competing hypotheses), IBE can be inconclusive. This conclusion raises an acute question: does it amount to confessing irrationality of IBE? Does it mean acknowledging (cognitive and/or epistemic) relativism?

To conclude this talk, we will answer negatively to this question. We will argue that the possibility of inconclusive outcome from IBE does not necessarily lead to relativism. In a nutshell, we will claim that inconclusive IBE can consist in non-relativist faultless disagreement. To support this claim, we will first elucidate elements whose admission would irremediably condemn inconclusive IBE to a relativist interpretation. Then, we will indicate why the admission of such elements is by no mean indispensable, thereby defending the possibility of non-relativist faultless disagreement through inconclusive IBE.

### **Short Bibliography**

- Bell, John Stewart. 2004. *Speakable and Unspeakable in Quantum Mechanics: Collected papers on quantum philosophy*. Cambridge university press.
- Belousek, Darrin W. 2005. "Underdetermination, Realism, and Theory Appraisal: An Epistemological Reflection on Quantum Mechanics." *Foundations of Physics* 35 (4):669-695.

- Bohm, David, and Basil J Hiley. 1993. *The undivided universe: An ontological interpretation of quantum theory*. Routledge.
- Bohr, Niels. 1935. "Can Quantum-Mechanical Description of Physical Reality be Considered Complete?" *Physical Review* 48 (8):696-702.
- Campos, D. G. (2011). "On the Distinction Between Peirce's Abduction and Lipton's Inference of the Best Explanation." *Synthese*, 180, pp. 419-442.
- Dürr, Detlef, and Stefan Teufel. 2009. *Bohmian Mechanics*. Springer Berlin Heidelberg.
- Einstein, Albert, Boris Podolsky, and Nathan Rosen. 1935. "Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?" *Physical Review* 47 (10):777-780.
- Esfeld, Michael, Mario Hubert, Dustin Lazarovici, and Detlef Dürr. 2013. "The Ontology of Bohmian Mechanics." *The British Journal for the Philosophy of Science*.
- Fischer, R. W. (2014). "Why it Doesn't Matter Whether the Virtues are Truth-Conducive.", *Synthese*, 191, pp. 1059-1073.
- Griffiths, Robert B. 2011. "EPR, Bell, and quantum locality." *American Journal of Physics* 79 (9):954-965.
- Harman, G. H. (1965). "The Inference to the Best Explanation." *Philosophical Review*, 74, pp. 173–228.
- Josephson, J. R. and Josephson, S. G. (1994). *Abductive Inference* (eds.). Cambridge, Cambridge University Press.
- Keas, M. N. (2017). "Systematizing the Theoretical Virtues." *Synthese*, DOI 10.1007.
- Kuhn, Thomas Samuel. 1977. *The Essential Tension*. University of Chicago Press, Chicago, US.
- Laloë, Frank. 2001. "Do we really understand quantum mechanics? Strange correlations, paradoxes, and theorems." *American Journal of Physics* 69 (6):655-701.
- Lipton, P. (2004). *Inference to the Best Explanation*, 2<sup>nd</sup> edition. London, Routledge.
- Mackonis, A. (2013). "Inference to the Best Explanation, Coherence and Other Explanatory Virtues." *Synthese*, 190, pp. 975-995.
- McMullin, E. (2014). "The Virtues of Good Theory." S. Psillos and M. Curd. (ed.), *The Routledge Companion to Philosophy of Science*, New York, Routledge, pp. 498-508.
- Misak, Cheryl. 2004. "Making Disagreement Matter: Pragmatism and Deliberative Democracy." *The Journal of Speculative Philosophy* 18 (1):9-22.
- Putnam, Hilary. 1981. *Reason, truth and history*. Cambridge University Press.
- Putnam, Hilary. 1999. *The threefold cord: mind, body, and world*. Columbia University Press.
- Putnam, Hilary. 2002. *The collapse of the fact/value dichotomy: and other essays*. Harvard University Press.
- Putnam, Hilary. 2004. *Ethics without ontology*. Harvard University Press.
- Rooney, Phyllis. 1992. "On Values in Science: Is the Epistemic/Non-Epistemic Distinction Useful?" *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association* 1992:13-22.