

# Constructive Verification, Empirical Induction, and Falibulist Deduction: A Threefold Contrast

Julio Michael Stern\*

*Institute of Mathematics and Statistics of the University of São Paulo*

We will analyze the verification problem and other related questions from the perspective of Cog-Con - the Cognitive Constructivism epistemological framework. Cog-Con comes equipped with the statistical apparatus of FBST - the Full Bayesian Significance Test. FBST, in turn, defines a statistical support function for sharp hypothesis, namely, the e-value - *epistemic value* of a hypothesis given the observed data, or *evidence value* of the data in support of the hypothesis.

The FBST solution to the problem of verification is indeed very thin, in the sense that the proposed epistemic support function, the e-value, although based on a Bayesian posterior probability measure, provides only a possibilistic support measure for the hypothesis under scrutiny. We will see how this apparent weakness is in fact the key to overcome the barrage of classical impossibility results alluded by Popper.

Nevertheless, the simultaneous Cog-Con characterization of the supported objects (sharp or precise hypotheses) as eigen-solutions implies such a strong and rich set of essential properties, that the Cog-Con solution becomes also very positive. Moreover, the FBST formal apparatus naturally implies a logic, that is, an abstract belief calculus for composition of support functions and a mechanisms for truth propagation in credal networks. In this context, we are able to uphold the cause for the Cog-Con framework as a solution to (a specific form of) the problem of verification that is capable of fulfilling (at least in a substantial part) Lakatos' famous plea to Popper for a "whiff of inductivism".

## References

- W.Borges, J.M.Stern (2007). The Rules of Logic Composition for the Bayesian Epistemic e-Values. *Logic Journal of the IGPL*, 15, 5-6, 401-420. doi:10.1093/jigpal/jzm032 .
- P.A.Schilpp (1974). *The Philosophy of Karl Popper*. v.1,p.1-670, v.2,p.671-1323. La Salle: Open Court. Ch.5, p.241-273 by Imre Lakatos: Popper on Demarcation and Induction. Ch.32, p.1100-1114 by Karl Popper: Replies to my Critics.
- C.A.B.Pereira, J.M.Stern, S.Wechsler (2008). Can a Significance Test be Genuinely Bayesian? *Bayesian Analysis* 3,1,79-100.
- J.M.Stern (2003). Significance Tests, Belief Calculi, and Burden of Proof in Legal and Scientific Discourse. *Frontiers in Artificial Intelligence and its Applications*, 101, 139-147.
- J.M.Stern (2004). Paraconsistent Sensitivity Analysis for Bayesian Significance Tests. SBIA'04. *Lecture Notes Artificial Intelligence*, 3171, 134-143.
- J.M.Stern (2007). Cognitive Constructivism, Eigen-Solutions, and Sharp Statistical Hypotheses. *Cybernetics and Human Knowing*, 14, 1, 9-36.
- J.M.Stern (2008). Decoupling, Sparsity, Randomization, and Objective Bayesian Inference. *Cybernetics and Human Knowing*, 15, 2, 49-68.

---

\*jmstern@hotmail.com