Significant but Inconclusive Evidence

Abstracts:

Richard Dawid (Stockholm)

The theoretical side of inconclusive evidence

Empirical evidence for or against a given hypothesis can be considered inconclusive for a number of reasons: there may just not be enough data to reach required significance levels: theoreticians may have an insufficient grasp of the way in which the collected data relates to the hypothesis under scrutiny; experimentalists may have doubts about the reliability of their experimental setup. But even if none of those reasons apply at first glance, the theoretical import of the collected data may be considered inconclusive for another reason: it may threaten a theory that is highly trusted. The talk will focus on the latter type of situation from a Bayesian perspective and use it as a basis for discussing an element of theory assessment that is highly relevant in all cases of inconclusive evidence.

Ulrike Hahn (Birkbeck)

Did statistical practice hamper Covid debate?

A recurring feature of Covid debate on science Twitter was the to and fro between scientists that warned of emerging risks or issues, and those that dismissed evidence as 'not yet good enough' or failing rigorous standards of scientific research. Yet, despite those supposed failings, supposedly 'unfounded' predictions frequently proved true. This talk examines the role that an undue emphasis on null hypothesis testing as a statistical framework may have had on misjudgmensts and errors in evidence aggregation.

Wendy Parker (Virginia Tech)

What caused the pause? Substantial but inconclusive evidence in climate science

Some hypotheses about climate change are established beyond any reasonable doubt. For other hypotheses, the evidence is substantial but not so conclusive. A high-profile example of the latter concerns the cause of the recent “pause” (or “hiatus”) in global warming, a slowdown in the rise of global mean surface temperature that occurred during the first decade of the 21st century. The leading hypothesis today is that the pause was mainly, or at least to a large extent, a consequence of processes at work in the Pacific Ocean; some of the heat that would have warmed earth's near-surface atmosphere was instead transported into the deeper ocean during this period. In this talk, I will review the varied and piecemeal evidence that supports this conclusion and will discuss why I think the evidence should be considered substantial but not conclusive. This will require considering, among other things, the evidential value of computer simulation results, which figure prominently in this case and in climate science more generally.

Joe Roussos (Stockholm)

Representing uncertainty in cases of very incomplete evidence
How should our uncertainty be represented in cases of sparse evidence? Philosophers have largely treated this as a question about how a rational agent's beliefs should be structured. The popular Bayesian view is that rationality requires that our beliefs be probabilistic, and so all uncertainty is represented by means of probabilities. But constructing probabilities requires going beyond the information available in cases of very incomplete evidence. I formulate this as a contravention of the evidentialist norm to proportion one's belief to the evidence. In high-stakes policy situations it is particularly important not to misrepresent the evidential situation, which Bayesian probabilities risk doing. I illustrate these risks with two examples, about regional climate projections and early Covid-19 pandemic planning. In such environments these risks trump the kinds of pragmatic and epistemic concerns which motivate for Bayesianism. The result is a contextualist picture, on which the right representation of uncertainty depends on the informational environment we find ourselves in. I reflect on how this argument relates to traditional formulations of Bayesianism as a decision theory and a theory of confirmation.

Karim Thebault (Bristol) and William Wolf (Oxford)

Evidential Triangulation and Explanatory Depth in Modern Astrophysics and Cosmology.
In this talk we will investigate sources of significant but inconclusive evidence in modern astrophysics and cosmology. The first part of the talk will focus on the role of *evidential triangulation* in the context of stellar nucleosynthesis. We will argue that the level of evidential support for astrophysical conclusions is not circumscribed by the manipulability or accessibility of the target phenomena. The categorisation of astrophysical evidence as insignificant, significant, or conclusive depends upon the reliability of the external validation of the relevant source-target inference rather than the mode of inductive inference involved. The second half of the talk will consider the role of evidence based upon considerations of *explanatory depth* in the context of selecting models for primordial cosmology. We develop and apply a multi-dimensional conception of explanatory depth towards a comparative analysis of inflationary and bouncing paradigms in primordial cosmology. We suggest that the different choices with regards to explanatory strategy available have direct implications for the heuristics of model building in contemporary cosmology. The nature of the modelling choice can thus in part be understood in terms of a disagreement over different strategies regarding how best to constrain theoretical practice. We will conclude by offering some thoughts on the potential connections between evidential triangulation and our multi-dimensional account of explanatory depth at the intersection of the astrophysical and cosmological domains.

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