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Introduction to the Special Issue

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Abstract

This is the introduction to the special issue "The Meta-Inductive Approach to Hume's Problem". The introduction includes introductory remarks and brief comments on each of the papers appearing in the special issue.

The meta-inductive approach to the problem of induction is a descendant of Reichenbach's best alternative defense of induction. According to Reichenbach's approach, one ought to use induction, because, regardless of whether nature is uniform, one will always have at least as good predictive success if one uses induction, as opposed to any alternative method. Unfortunately, it is straight forward to produce counterexamples to the claim that induction always has at least as good predictive success as any alternative method. For example, in some conceptually possible situations, heeding the pronouncements of a genuine clairvoyant fortune teller will result in greater predictive success than using induction.

In the spirit of Reichenbach's approach, recent work of Schurz argues that there is a variety of induction, which Schurz calls meta-induction (or, more precisely, attractivity weighted meta-induction), that is guaranteed to perform at least as well as any feasible alternative. Roughly speaking, meta-induction consists in the application of induction to other prediction methods, attempting to anticipate which method or methods it would be best to emulate. Drawing upon research in machine learning, Schurz shows that meta-induction is

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guaranteed to have predictive success that is at least as great as the predictive success of the most successful method to which it is applied. Thus, according to Schurz, one ought to use meta-induction, because, regardless of whether nature is uniform and regardless of what other prediction methods one has access to, one will always have at least as good predictive success if one uses meta-induction, as opposed to any alternative method to which one has access. Schurz argues that ordinary 'object induction' (i.e., induction applied at the level of objects, rather than methods) is justified via the optimality of attractivity weighted meta-induction: Roughly speaking, when we apply attractivity weighted meta-induction to the set of methods to which we have access, attractivity weighted meta-induction tells us that our predictions should be guided by object induction (since, as a matter of contingent fact, object induction is the only *attractive* object method to which we have access).

The outlines of Schurz' approach were first presented in a 2008 paper "The Meta-inductivist's Winning Strategy in the Prediction Game", published in *Philosophy of Science*. Since then, the approach has been refined and extended in a number of papers, with ongoing work culminating in the monograph "Hume's Problem Solved: The Optimality of Meta-Induction", which was published in 2019. This collection consists of diverse discussions of Schurz's meta-inductive approach to the problem of induction, along with discussions of related subject matter presented in Schurz's 2019 book.

Tomoji Shogenji's paper consists of a direct critique of Schurz's program of justifying object induction by appeal to meta-induction. In service of his critique, Shogenji purports to identify two tensions in Schurz's claim to justify induction by appeal to meta-induction. The first purported tension concerns the palpable gap between actual inductive practice (which generally makes no reference to meta-induction) and the supposed justification of induction by meta-induction. A second, and perhaps more significant, tension lies in the relatively high degrees of credence that are typically placed in the conclusions of inductive inferences and the relatively modest species of justification that is supplied by meta-induction, according to Schurz's approach. Shogenji argues that the best way to defend typical inductive practice is to recognize non-meta-inductive means of justifying induction. Shogenji outlines his own interesting ideas concerning the justification of inductive practice. If such means of justifying our inductive practice can be given, then, as Shogenji correctly observes, the importance Schurz's meta-inductive approach to justifying induction would be decidedly diminished. In his paper in the volume, Schurz argues that Shogenji's ideas concerning how to justify our inductive practice are not cogent.

In his paper, J. Brian Pitts elaborates a worry about Schurz's approach to the problem of induction. The worry concerns the possibility of arbitrating between conflicting claims concerning the past reliability of competing prediction methods. Pitts's worry is thus that there is a difficulty in applying meta-induction to justify object induction, insofar as there is a difficulty in establishing a favored viewpoint by which the past reliability of object induction can be established in comparison to alternative methods. Pitts frames his worries within an interesting historical study of the manner in which testimony has been used to bolster non-inductive methods in the service of theological content. Pitts's position represents a legitimate challenge to Schurz's approach to the problem of induction which calls on Schurz to offer a framework for the objective adjudication of competing claims for the reliability of alternative prediction methods. Schurz meets this call in his paper, where he outlines a framework for evaluating claims concerning the reliability of prediction methods.

The paper of David Wolpert presents the author's response to recent work of Schurz (Schurz and Thorn 2022) which was directed at explaining why there is no contradiction between Wolpert's no free lunch theorems and the optimality results that serve as the basis of Schurz's approach to the problem of induction. There is considerable diversity in the range of results that have been described as *no free lunch theorems*. The results that were the object of Schurz's previous discussions show that the average loss of every 'non-clair-voyant' prediction method over the range of logically possible event sequences is identical. Such results appear to conflict with the optimality of meta-induction. But, according to Schurz, the conflict is only apparent. As emphasized by Schurz: By averaging over all possible event sequences, no free lunch results tacitly assign zero probability to the uncountable number of event sequences where induction outperforms competing methods. Both Wolpert's paper and Schurz's response focus on addressing the following question: Are there no free lunch results that do not in some way rule out induction friendly environments, by tacitly assigning such environments zero probability, or similarly counting all possible event sequences in way that assigns zero weight to induction friendly environments?

Unlike the papers of Shogenji, Pitts and Wolpert, the paper of Ronald Ortner does not present a direct critique Schurz's approach to the problem of induction. Rather than present a critique, Ortner presents a survey of optimality results concerning a range of settings, including some that are more general than the setting of prediction games that forms the center piece of Schurz's approach. One key assumption that Ortner is keen to relax is the assumption of full access to the predictions all experts (or object methods). Ortner uses the setting of multi-arm bandit problems to relax the assumption of 'full access'. Within this setting, the arms of the bandit are understood to be experts and the meta-method only gets feedback within a given round for the arm that the meta-method selects. Ortner also observes that there are two broad categories of settings that have been studied with online learning: (i) so called "stochastic" settings in which events are determined by a fixed but unknown probability distribution and (ii) "adversarial" settings in which events are *not* determined by a fixed probability distribution. Ornter pays particular attention to meta-inductive methods that perform well in both stochastic and adversarial settings. The results presented by Ornter appear to bolster Schurz's approach to the problem of induction, as they show that there are forms of meta-induction that are optimal within adversarial multi-arm bandit problems.

In his paper, Jon Williamson presents an apparent conflict between a widely accepted principle of direct inference, the so called "principle of the narrowest reference class" and standard versions of probabilism. This is a problem for many formal epistemologists, including Schurz, who would like to accept the principle of the narrowest reference class, along with a standard version of probabilism. The main point of contention raised by Schurz in discussing Williamson's paper concerns Williamson's formulation of the principle of the narrowest reference class. Schurz argues that the conflict between standard versions of probabilism and principle of the narrowest reference class only arises due to a deficit in Williamson's formulation of principle of the narrowest reference class. Schurz proposes an amendment to Williamson's formulation of principle and claims that the amendment resolves the conflict between the principle and standard versions of probabilism. Schurz has a point that a conflict with standard versions of probabilism might be avoided by an apt formulation of the principle of the narrowest reference class. We are not fully convinced that Schurz's formulation is optimal and think this is interesting topic for further discussion.

In her paper, Atocha Aliseda investigates problems of abductive theory revision. Aliseda identifies some open problems concerning abductive theory revision in the framework of AGM belief revision and proposes a solution, building upon work of Schurz. The basic problem that concerns Aliseda is preserving the explanatory components of theories across theory revisions: In a situation where a hypothesis h explains a body of evidence E at given time and we later come to possess a piece of evidence e which is inconsistent with h, we would prefer, if practicable, to make a revision of h to form a hypothesis h* that explains E and e, rather than simply add e to our belief set and abandon h. The specific innovation presented by Aliseda is the introduction of a procedure for abductive hypothesis refinement by existential instantiation. With this procedure a hypothesis is revised by the addition of an existential statement concerning a previously unknown disturbing factor that accounts for newly observed evidence e that would otherwise conflict with our previously held hypothesis h.

The final paper of the collection is by Gerhard Schurz. The paper recapitulates Schurz's most recent thoughts concerning the meta-inductive approach to the problem of induction and includes lively discussions of all of the other papers appearing in the collection.

Declarations

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

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