Marianne Talbot Essay Prize Trinity 2026

First Prize: Enyuan Sheng

Is it important to be able to offer an answer to the Problem of Induction?

Induction is a fundamental form of reasoning in both everyday thinking and professional inquiry. However, the justification of inductive reasoning has long been challenged by the Problem of Induction (PoI). This essay argues that offering an answer to the PoI remains philosophically important. The PoI exposes significant limitations in our attempts to acquire empirical knowledge, particularly the underdetermination of theory by empirical evidence. Although numerous approaches have been developed to tackle or live with PoI, they appear to have only postponed the adequate resolution of this underdetermination predicament. Offering an answer to the PoI would still shed light on how theories can be determined from empirical evidence.

The Problem of Induction (PoI)

Induction typically involves drawing conclusions that extend beyond the information contained in the premises. One important form of induction is enumerative induction, which seeks to generalise conclusions from finite sets of empirical cases to non-empirical ones. For example, from the premise "all observed emeralds so far are green", we may conclude that "all emeralds are green". Although such reasoning often seems natural, it incurs what is known as the Problem of Induction (PoI): how can we be sure that such conclusions beyond our experience are valid?

The PoI is intractable, as David Hume persuasively demonstrated. Unlike deduction, where the truth of the conclusion is implied by the truth of the premise, induction produces conclusions whose truth cannot be guaranteed (Hume 1748, 4.1.7). Existing observations do not logically entail that things will always be this way. It is possible that some future emeralds will differ from those observed in the past, even though we have never experienced this. Hume's scepticism might invite a rebuttal based on the assertion that nature is uniform; that is, since natural patterns have remained stable in the past, they will likely remain so in the future. Yet, this rebuttal is inevitably circular (Hume 1739, 1.3.6.4). The claim of nature's uniformity is itself an inductive assumption, as it depends on the inference that, since nature has behaved consistently in the past, it will continue to do so. Using the success of induction to justify induction presupposes the very principle that requires justification. Hume's demonstration shows that past experience alone lacks independent, non-circular justification for beliefs that extend beyond it.

One Umbrella Problem for PoI: Underdetermination

Perhaps we can accept that, as Hume (1748, 5.1.8) put it, induction operates entirely on a "habit of mind" that assures us of nature's uniformity. However, the PoI implies not only that we lack sufficient experience to draw conclusions, but further that the same experience can support many equally valid conclusions. Nelson Goodman's (1955) classic example illustrates this predicament succinctly: even if all observed emeralds

have been "green" and we have inferred that all future emeralds will be "green", those future emeralds could simultaneously be "grue" (i.e. either already observed and green, or not yet observed and blue). Technically speaking, there are always hypotheses such as the "grue" one that are empirically equivalent to the "green" one. This means that, premised on given empirical evidence (at a given time), we can always inductively arrive at multiple, mutually incompatible conclusions or theories, none of which can be sufficiently determined by the evidence itself. Therefore, the initial PoI can be expanded from a problem concerning the legitimacy of the gap between a theory and its empirical evidence into a further problem of the underdetermination of theory choice.

Internal Resolution: "Determining" the Theory through Induction

Some would contend that it is not impossible to choose among rival conclusions or theories gained through induction. Generally speaking, introducing additional "determinants" can certainly help to achieve this goal. One such way is to resort to abduction, or inference to the best explanation. As another primary form of induction, abduction provides a richer account of theory choice than simple enumerative induction. It introduces additional "epistemic virtues", such as explanatory power, simplicity and coherence, to further evaluate the theories beyond their fit with existing observations. In this way, even if multiple theories are compatible with the same evidence, we may still have grounds good enough for preferring one theory because it provides a better explanation (Lipton 1993).

Another approach is to appeal to probability theory. Probability theory, particularly that based on Bayesian laws, can inform the choice of theory by distinguishing between the degree of belief in different theories. By predefining a probabilistic model, constant observations such as "emeralds have been green" would give the theory "the next emerald will be green" greater discriminatory power and accordingly, a higher degree of belief compared to other competing theories. Theories may be logically compatible yet evidentially unequal, and for some, this is sufficient justification for selecting a theory (Stove 1986, 51-4).

It is perhaps worth giving further consideration to whether or in what sense these approaches genuinely *determine* a theory. Epistemic virtues, to borrow Bas van Fraassen's (1989, 143) phrase, may only allow us to choose "the best of a bad lot"; probabilistic models, likewise, may merely distinguish between theories and their posterior probabilities (and in some cases, theories can be evidentially equivalent). Strictly speaking, these methods only help us determine which theory is *preferable* rather than actually determining the theory itself.

Based on Reichenbach's pragmatic position, some might argue that it is enough to establish or "vindicate" that a theory is more successful to its rivals in induction without seeking a complete inference from evidence (Feigl 1950, 119-56). The aim of induction, they would say, is all about coming up with more and more successful theories, thereby approaching a limit that enable us to make sound predictions about the empirical world (Reichenbach 1949, 475).

However, regardless of how the successful theory is "determined", the "determination" will ultimately be non-empirical in nature. The hallmark of the PoI and its deeper underdetermination problem is that no additional empirical evidence (at any given point in time) can help us to make a theoretical choice. Any new "determinant" introduced, such as virtues or models, may merely reflect our preferences or assumptions about the world rather than the empirical world itself. In this sense, even attempts at resolution through pragmatism may be self-defeating. These approaches merely allow competing theories to be evaluated by empirical evidence, whilst pushing their determination by empirical evidence down the line.

External Resolution: Sidestepping Induction and Its Problem Altogether

In order to prevent PoI from plaguing the empirical investigation of the world, some may choose to base their investigation on forms of reasoning other than induction. Building on Karl Popper's ([1935], 1959) falsificationism, it can be argued that investigations, particularly scientific ones, can advance through a kind of deductive testing—researchers formulate bold hypotheses and attempt to "falsify" or disprove them through observation. This approach does not require theories to be confirmed; it merely requires theories that conflict with empirical evidence to be eliminated. In other words, "empirical evidence" no longer supports confirmation, but rather supports elimination. We may accordingly "determine" theories—false theories—from empirical evidence, while the remaining or upcoming theories will increasingly approximate the truth about the world.

However, deductive falsification might raise a more holistic underdetermination of theory. Whether a theory can be falsified often hinges on factors other than evidence alone, particularly a web of auxiliary assumptions regarding measurement methods, background theories and experimental conditions. When a theory seemingly fails, it is not always clear whether it is the theory itself or one of its auxiliary assumptions that should be discarded (Duhem [1914] 1954, 185). Researchers are free to choose not to abandon the theory itself, but rather to revise other parts of the web—which may even include the logical principles themselves (Quine 1951, 43). This suggests that deduction alone cannot precisely select which theories should be retained or abandoned and that the theory being abandoned is, essentially, underdetermined. Popper (1963, 239) responds by calling for a consensus on exactly what is being tested and what is not. Yet it implies that the exclusionary selection and surviving residue of theories will still reflect something about us, but not necessarily the world.

Conclusion

The Problem of Induction (PoI) reveals not only the logical leap from empirical evidence to the theories derived from it, but also a more fundamental issue of underdetermination of theory. Within this scope, the various internal and external PoI solutions discussed in this essay do not eliminate this theoretical underdetermination posed by the PoI but merely address it in a partial or superficial way. The epistemic virtues of abduction and Bayesian probability models evaluate theory rather than

strictly determine it, whilst deductive falsificationism still faces the underdetermination problem caused by auxiliary theories. Ultimately, the choice of theory will inevitably be pragmatic and deviate from the empirical world that the PoI focuses on. Consequently, the PoI retains its significance as a problem to be answered. While there may be no panacea for this problem, exploring it would still illuminate how empirical inquiry can legitimately claim to yield knowledge.

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