Bayesianism, Inference to the Best Explanation, Formal Learning Theory, and its Hegemony: A Justification of IBE

Patrick Neal Rooyakkers

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1 Introduction

Formal Learning Theory (FLT) and Inference to the Best Explanation (IBE) are both theories of induction. They are about patterns of reasoning that draw conclusions not entailed by the relevant premises. Here, we will understand the drawing of such conclusions as being about what is rationally required to believe given one's evidence and not about claiming that the inferred conclusion is true or likely to be true¹. It is worth noting that this makes inductive reasoning unlike deductive reasoning, which admits of a plausible metaphysical understanding: it is the study of truth-preserving arguments. The thesis of this paper is a bold one. We argue for the hegemony of FLT with respect to inductive matters². Specifically, we claim that any adequate detailing of Inference to the Best Explanation is completely covered by the details of Formal Learning Theory with the rest of IBE consisting of heuristic, practical, or stagesetting matters. Furthermore, we detail how the FLT Hegemony Thesis bares many desirable fruits. Now, before getting to our upshots or arguments for FLT Hegemony, we begin by briefly reviewing FLT and IBE and then locating our Hegemony Thesis in the current context of discussion.

2 Review of Formal Learning Theory

Formal Learning Theory is a theory of inductive inference. In slogan form, it says that one ought to do the best they can do in the relevant empirical problem. More precisely: it is a requirement of epistemic rationality that, upon receiving a stream of evidence, one's beliefs/credences converge to the truth the fastest in

¹The latter understanding, although extremely common, is a hopeless matter as pointedly demonstrated by (Kelly, 2007). After all, the world might not be simple; maybe it's complex. The world might not be unified; maybe it's dappled (Cartwright, 1999). Etc.

 $^{^{2}}$ The idea of a hegemony thesis with respect to inductive matters is not new to the relevant literature. See (Harman, 1965) and (Weintraub, 2012) who argue for the hegemony of IBE over enumerative induction.

the worst possible case. Surprisingly, this is, often times, enough to develop an argument for Occam's Razor: it is a requirement of epistemic rationality that one believe a maximally simple hypothesis. This result is all we will need from FLT to mount our argument for FLT's Hegemony over IBE. Unfortunately, this is not the place to fully present and detail FLT. If unfamiliar, we encourage the reader to check out (Lin, 2022) (Genin & Kelly, 2018) (Schulte, 2023) (Genin, 2018) (Genin, 2022) for the details and definition of more complicated accounts of empirical simplicity used in the statement of Occam's Razor. It is enough, for our purposes, to equate simpler hypotheses with more falsifiable hypotheses. A hypothesis is said to be more falsifiable than another if that hypothesis is compatible (logically or statistically as the case may be) with less possible evidence that an agent might receive (in the relevant empirical problem). For example, the hypothesis of "Every raven is black" is simpler than the hypothesis "There exists a non-black raven" because the former is more falsifiable than the latter. Save it to say that we list some accomplishments of Formal Learning Theory. These accomplishments are hard to understate: it solves Hume's Problem of Induction (Genin & Kelly, 2018), Goodman's New Riddle of Induction (Schulte, 1999) (Steel, 2009), Hempel's Raven Paradox (Lin, 2022), justifies enumerative induction (Lin, 2022), recovers the Standard Model of particle physics (Schulte, 2008), justifies Occam's Razor (Genin & Kelly, 2018), supports common assumptions found in causal discovery (which, as apply recognized by (Hume, 1748) so long ago, is just another inductive problem) (Genin & Mavo-Wilson, 2022) (Lin & Zhang, 2020) (Kelly & Mayo-Wilson, 2012), and refutes a version of the pessimistic meta-induction argument (Rooyakkers, ms).

3 Review of Inference to the Best Explanation

Inference to the Best Explanation is a theory of inductive inference, first explicitly introduced under this name by (Harman, 1965). In slogan form, it says that one ought to infer a best explanation of your evidence. While there are many possible explications of this slogan, we will be primarily concerned with the following understanding: it is a requirement of epistemic rationality to believe (or have highest/high-enough credence) in a maximally virtuous (i.e. best) explanation/hypothesis of your (total) evidence³. The idea here is that there is a list of explanatory virtues such that some explanation is better than another with respect to some virtue V, ceteris paribus, if that explanation has V to a greater extent than the competing explanation. Unfortunately, this is not the place to catalog and classify all of the purported explanatory virtues. See (Cabrera, 2017) and (Keas, 2017) for such a catalog. In this paper, because we are focused on an epistemic rationality conception of IBE, we will be concerned solely with epistemic virtues. In particular, we will consider the virtues of unifi-

³Later on, we address, and ultimately criticize, (Douven, 2022)'s dynamic explication of IBE. While I do not claim that these explications exhaust the possible formulations of IBE, it is important to keep in mind that this doesn't make our chosen explication any less interesting.

cation, scope/breadth, non-ad-hocness, precision, and mechanism⁴. We will be preoccupied with showing how FLT can account for these virtues, but first we locate our FLT Hegemony Thesis in the current context of discussion.

4 Where We Stand

Recently, there has been much investigation into the relationship between IBE and Bayesianism. Are they compatible or not? We begin by briefly reviewing the current status of this question in the literature. (Weisberg, 2009) demonstrated that the following two conditions are logically incompatible:

(1): Subjective Bayesianism: Probabilism+Conditionalization is a complete⁵ theory of epistemic rationality (for credences).

(2): IBE (with respect to our understanding of IBE).

To be clear, this result does *not* show that the Bayesian norms of Probabilism or Conditionalization conflict with IBE; it is the purported completeness of those norms that conflicts with IBE, with the conflict arising because Subjective Bayesianism tracks *only* Bayes-coherence while IBE tracks explanatory goodness (Weisberg, 2009).

Here is how the proof goes: Choose a (explanatory) hypothesis h that is uniquely maximally virtuous with respect to evidence E with the tie-breaking virtue being of the "informational" kind⁶ (Popper, 1959) (Cabrera, 2017). Then choose a prior such that conditionalization on that prior by E does not assign highest conditional confidence to h (or, and more satisfactorily⁷, if we give an all-or-nothing belief formulation to IBE and grant some version of the Lockean Thesis (for which we have many good arguments (Hempel, 1962) (Easwaran, 2015) (Dorst, 2017) (Fitelsen, Easwaran, & McCarthy, 2014) (Rothschild, 2021)(Rooyakkers, ms)) assign high enough credence). Done⁸.

⁴This list was not chosen arbitrarily. The included virtues are widely considered to be epistemic in nature, as opposed to, say, pragmatic in nature, and they are all not entailed by the probability axioms in the sense that if some explanation H is more virtuous, ceteris paribus, than explanation H' with respect to virtue V, then any probability function must assign a higher number to H than H'. See (Cabrera, 2017) for details.

 $^{^5\}mathrm{A}$ list of rational requirements is said to be complete if no rational requirement is missing from the list.

⁶That is, an explanatory virtue that is not entailed by the probability axioms.

⁷As we argue below.

⁸For a concrete example, consider a counterinductive learner who, upon seeing a black raven, becomes less confident that all ravens are black. This learner can hardly be described as following IBE, even according to explications different from our own (such as (Douven, 2022) and (Lange, 2020)). Such a learner can still, nevertheless, be a good Bayesian. The point here is that being a good Bayesian does not require one to follow IBE, so while Subjective Bayesianism says that the counterinductive learner is rational, IBE says that they are not. Hence the logical incompatibility of Subjective Bayesianism and our explications of IBE. See (Weisberg, 2009) for another case.

Now, in response to this no-go result, some IBE-ists (Okasha, 2000) (McGrew, 2003) (Lipton, 2004) choose to reject IBE as a fundamental rational norm and argue for its place in our reasoning as being just a heuristic for Subjective Bayesian reasoning. Such arguments are not convincing. (Weisberg, 2009) has shown how such a response "doesn't just rob IBE of some of its most interesting applications; it also robs it of much of its intuitive appeal, since IBE inherits the extreme subjectivity of subjective Bayesianism."⁹

Furthermore, some IBE-ists have gone even further by arguing that IBE is not about rationality (or justification¹⁰) at all, but is rather about the acceptability of "...whether H is worthy of commitment as a research program, which in turn depends on whether H meets the goals of science." (Cabrera, 2017). Such a response amounts to dropping a purely epistemic understanding of IBE. Cabrera argues for this position by showing that not all of the explanatory virtues are necessarily truth-conducive in the sense that they "must have some bearing on the probable truth of hypotheses that manifest them". Such arguments are not convincing for a variety of reasons, as developed by (Henderson, 2022). Here we note and elaborate on one such reason, with the upshot being that Cabrera's concerns only succeed in refuting the "highest-credence" account of IBE. (Henderson, 2022) writes that:

"It is worth noting that also from a Bayesian point of view, the evaluation of relative support or probability between hypotheses does not give the full story about epistemic appraisal. Bayesians have treated the general problem of which hypothesis to accept (or believe) by introducing some kind of detachment rule. A simple-minded version of this would be a probabilistic threshold...[that is, a Lockean viewpoint]."

The idea here is that while some explanatory virtues are not necessarily truthconducive in Cabrera's sense, such virtues might be conducive to promoting epistemic value, and this is what matters. Perhaps more specific or more informative true propositions are epistemically more valuable to believe than less specific or less informative true propositions. In fact, this idea has been put to productive philosophical work (Levi, 1967),(Dorst, 2017),(Dorst & Mandelkern, 2021),(Skipper, 2023). These observations motivate a varying-threshold Lockean-belief-centered formulation of IBE: it is a requirement of epistemic ra-

⁹Think counterinductive learner; such a learner seems irrational not just atypical. It is also just worth investigating what happens if we don't water down IBE (into IBE Lite), and see what happens if we reject the completeness of Bayesianism. After all, all the current arguments for such Bayesian norms do not establish their joint completeness. ¹⁰Because a justificatory formulation of IBE is provably at odds with subjective bayesian

¹⁰Because a justificatory formulation of IBE is provably at odds with subjective bayesian confirmation theory (Cabrera, 2017). Good thing that subjective bayesian confirmation theory is implausible anyways (Glymour & Kelly, 2003). A similar point is also raised by (Henderson, 2022).

tionality to believe a best explanation of your total evidence¹¹. Notice that this formulation does not say that one must believe *only* a best hypothesis; after all, what if the considered collection of hypotheses contains propositions properly entailed by such a best hypothesis. For this reason, the highest-credence formulation of IBE is simply ill-formulated¹² (although, a credence-only varying threshold view is still available). For this reason, we hereby refine our considered explications of IBE and consider only the belief or threshold formulation of IBE throughout this paper. Now, given the preceeding considerations against re-purposing or reformulating IBE, it is the purported completeness of the Probabilism+Conditionalization package that (Weisberg, 2009) ends up rejecting; we follow his lead.

So, where does this leave the IBE-ist? Assuming we want to maintain Probabilism+Conditionalization, there are just two options. Perhaps we want a more objective Bayesian theory of rationality. A Bayesian+O theory if you will. That is, a theory of rationality such that Bayesian+O entails IBE. The first case trivializes the matter and takes O=IBE. This constraint-based compatibilism has been criticized by (Henderson, 2014) for not providing an argument for IBE and just relying solely upon its intuitive appeal. In other words, why think that IBE is rationally required? Furthermore, as far as I know, there is no rigorous proof that such a compatibilist position is logically possible.¹³ The second case is one where $O \neq IBE$ or have IBE as a conjunct, which amounts to a kind of emergent compatibilism a la (Henderson, 2014). The second option takes IBE to be a heuristic for some kind of objective Bayesian reasoning. This option is not precluded by IBE's being a bad heuristic for subjective bayesian reasoning (Dellsén, 2017). Unfortunately, this is where the discussion has stalled; no concrete proposals for such additional IBE-friendly norms of rationality have been advanced or successfully argued for.

"Regrettably, I have no detailed proposals to offer in this regard." (Weisberg, 2009).

"In sum then, the Objective Bayesian response does not succeed in vindicating those virtues that I've argued are non-confirmational." (Cabrera, 2017).

"In my view, there is still work to be done to connect a detailed discussion of explanatory virtues to a broader conception of epistemic appraisal..." (Henderson, 2022).

¹¹In fact, the motivation might cut the other way as well. That is, if you're on board with FLT, then you ought to guess only maximally simple answers.

 $^{^{12}}$ This follows because if the highest-credence formulation of IBE is correct and the tautology is included in the collection of considered hypotheses, then IBE+Probabilism would rationally require certainty in a best hypothesis, which is absurd. An analogous argument could be mounted if the tautology is deemed unworthy of being explanatory.

 $^{^{13}\}mathrm{It}$ certainly doesn't help that most formulations of IBE are rather mushy in their formalization.

This paper attempts to fill this void. We take O=FLT and argue for FLT's hegemony over IBE. We suggest that FLT might be the holy grail that IBE-ists have been looking for. But first we look at three upshots of the FLT Hegemony Thesis.

5 Three Cheers for FLT Hegemony

5.1 Hip...

One significant advantage of the subsumption of IBE under the banner of FLT is that the proof of Compatibility Theorems¹⁴ between Bayesian norms of rationality and Formal Learning Theory, as found in (Juhl, 1997) and (Lin, 2022), are thus also proofs of the compatibility of IBE with such Bayesian norms.¹⁵ All that is needed to show the compatibility of IBE with Conditionalization is to show that the rational norm of IBE can be preserved under Conditionalization. These theorems do just that. This matters because some proponents of IBE have, in recent years, attempted to build the evidential/confirmational value of explanations into one's updating rule, thus advancing a kind of dynamic explanationism (Douven, 2022). Such attempts have been strongly, and rightly in my opinion, criticized for conflicting with the Bayesian norm of Conditionalization, for which we have many convincing arguments (van Fraassen, 1989) (Pettigrew, 2021).¹⁶ After all, (Douven, 2022) himself admits that if the arguments in (van Fraassen, 1989) and (Pettigrew, 2021) are sound, then they do provide a reason for favoring Conditionalization.¹⁷ Good thing we don't have to be dynamic IBE-ists of the van Fraassen stripe. The Compatibility Theorems allow us to have our cake and eat it too. We don't have to trade-off Conditionalization for certain learning-theoretic benefits.¹⁸ We can accept them both.

 $^{18}\rm Nor$ do we have to rethink our concept of rationality and move towards something like Douven's notion of ecological rationality, which is a kind of rationality-requires-an-optimal-

¹⁴Or possibly *In*compatibility Theorems (Rooyakkers, ms)

 $^{^{15}}$ Why? Because if FLT entails IBE and Bayesianism+FLT is compatible, then basic logic gives us that Bayesianism+IBE is compatible.

 $^{^{16}}$ With the moral of (Pettigrew, 2021) being that because our updated credences are completely determined by our prior credences (on non-zero events) according to Conditionalization and Conditionalization is the correct updating rule, that any constraints imposed by IBE or FLT must be "encoded in the prior".

¹⁷ "...even if they [the arguments mentioned above] were sound (which they are not), absolutely nothing follows from the mere claim that vulnerability to dynamic Dutch books and/or failure to minimize inaccuracy is *really, really bad*. That could be a reason to abandon abduction [IBE] if it had at the same time been shown that there is nothing *really, really good* to be had by reasoning abductively, something that is out of reach for people sticking to Bayes's rule..." (Douven, 2022, original italics). Furthermore, as far as I can tell, the simulations that Douven claims support abduction over Conditionalization do not actually do so. If they do support something, they support abduction over Subjective Bayesianism with respect to certain concerns. In other words, the simulations do not rule out that there is no systematic subset, consisting of more Objective Bayesians, that does better than Douven's purported norm of dynamic explanationism. This concern is distinct from further concerns about how the outcomes of such simulations are to aggregatively evaluated, see (Pettigrew, 2021) for a discussion of this.

We end this section with a remark about the proper understanding of these Compatibility Theorems. It is important to understand what such theorems achieve and what they don't. These theorems show that the candidate rational norms are logically compatible; they don't show that the arguments for such norms are compatible. This is an interesting question. Future efforts should be devoted to answering it. Further efforts should also be directed towards proving, or disproving, Compatibility Theorems for more complicated empirical problems.

5.2 Hip...

Secondly, if the FLT Hegemony Thesis is correct, we gain the advantage of avoiding the difficulties involved in formally trading-off the potentially competing virtues found in IBE as FLT has only one virtue: empirical simplicity.¹⁹ After all, FLT has a precise and rigorous formalism, while IBE is, at best, mushy in that department.

5.3 Hooray!

Recently, in the philosophy literature, there has been a flurry of work on the development of rational models of various cognitive phenomena, often with the goal of showing how some purportedly irrational form of reasoning can be rationalized (Doody, 2019)(Dorst & Mandelkern, 2021)(Dorst, 2023a)(Dorst, 2023b). Such rational models make certain empirical observations normatively expectable in the sense that if one assumes that the relevant agents are fairly rational, then one should expect such-and-such behavior, especially when good arguments can be presented for the relevant rational norms. With this in mind, (Glymour, 2015) has argued against an extensive list of proposed measures of explanatory virtues on the grounds that such measures are empirically inadequate as a rational model of our actual explanatory reasoning, and I tend to agree. Luckily, if the we take O=FLT and accept the FLT Hegemony Thesis, then this gives us a rational model of IBE-reasoning²⁰. In other words, we should expect to find that people tend to follow IBE-reasoning by preferring more virtuous explanations.²¹ It seems they do²²:

response-to-your-actual-context account of rationality. This is not to say that ecological rationality is not interesting; it definitely is, but it's unclear why such actual optimality is about epistemic *rationality* as the details of the context may not be known. In other words, why call such non-optimal agents irrational rather than just unlucky?

¹⁹And hence avoiding a possible application of Arrow's Impossibility Theorem to muddying even the possibility of trading-off such virtues in the context of theory selection. (Okasha, 2011).

 $^{^{20}\}mathrm{And}$ motivates many novel empirical hypotheses about human cognition. This matter requires further empirical investigation.

 $^{^{21}}$ See (Douven, 2022) for further empirical evidence of this.

 $^{^{22}}$ Although, see (Lombrozo, 2007) for some possible difficulties. See (Zemla, Sloman, Bechlivanidis, & Lagnado, 2017) for a response.

"In two experiments, we find evidence that when evaluating explanations, people prefer explanations that are subjectively complex [simple, according to FLT] and appeal to multiple causal mechanisms." (Zemla, Sloman, Bechlivanidis, & Lagnado, 2017).

"Participants [in several experiments] rated explanations with concrete details higher than their abstract counterparts and in many cases they did not penalize the presence of causally irrelevant details." (Bechlivanidis, Lagnado, Zemla, & Sloman, 2017).

"Overall, participants preferred explanations that included mechanisms (Experiments 2, 4, and 5)." (Zemla, Sloman, Bechlivanidis, & Lagnado, 2023).

6 How FLT Accounts for IBE

In this section, we argue that all of the explanatory virtues that are claimed to make explanations better can either be directly accounted for by Formal Learning Theory or better understood as a discovery/search heuristic with a learning-theoretic rationale. We begin with a remark about how IBE supposedly differs from predictive inference:

"Accordingly, many prominent philosophical models of scientific reasoning emphasize the importance of prediction, especially of novel facts... However, sometimes we think that evidential support accrues to a hypothesis, not because of its ability to successfully predict novel facts, but because of its ability to explain, in an extraordinarily satisfying way, some particular fact or set of facts that we have already observed. In short, sometimes inference is mediated by explanation." (Cabrera, 2023).

The point: IBE emphasizes accounting for our current evidence (by explaining it). Why, from the perspective of Formal Learning Theory, would we be interested in explaining *our evidence*²³? At first, it might seem that Formal Learning Theory is unable to rationalize this kind of emphasis. After all, FLT only requires that we believe maximally simple hypotheses that are logically compatible

 $^{^{23}}$ We might also be interested in the question: why the emphasis on *causal explanation* in our inductive reasonings? Why not focus on other non-causal/non-explanatory ways of accounting for our evidence, if there be such? Well, perhaps we are just intrinsically interested in explanation. While that's one way to go, a different and more satisfying answer is given by (Woodward, 2005). This allows us to understand IBE as being a particular species of FLT, one that involves the stage-setting restriction of considering only explanatory hypotheses, a restriction often prompted by the asking of "Why E?". This stage-setting view gets support from the long history of understanding explanations as answers to why-questions. (Hempel & Oppenheim, 1948). Furthermore, we note that IBE is a proper species of FLT as there are questions of interest that aren't why-questions (i.e. are all ravens black?). I suspect that this is why it is sometimes claimed that the "explanation-part" of IBE doesn't really matter to accessing the status of IBE as a mode of inductive inference (Cabrera, 2023). What ultimately matters, it is claimed, is inference to the best.

with our evidence. However, this initial impression is mistaken. Suppose, for the moment, that explanation requires deduction, as in the Deductive-Nomological Model (Hempel & Oppenheim, 1948). Then, clearly, we should favor a hypothesis that explains our evidence because if we know that it explains our evidence, then we know that hypothesis is maximally simple (falsifiable) with respect to similar possible evidence because the "lawlike" regularity part of the explanation (in conjunction with some supplementary conditions) entails similar non-yet-observed phenomena and is thus falsifiable in empirical problems with a clopen evidential topology. Formal Learning Theory rationally demands that we favor maximally simple hypotheses, so IBE's stress on explanatorily accounting for our current evidence just is about ensuring the simplicity of the relevant hypotheses. For example, if you come to possess evidence that some particular raven is black and you know that you have received such evidence, then you learn that receiving this type of evidence is possible, that is, you can receive evidence about the color of ravens.

A similar story can be told when we drop the "explanation requires deduction" assumption and appeal to Statistical Formal Learning Theory (Genin, 2018)(Genin, 2022). It is often claimed that hypotheses that convey a higher probability to one's evidence are better, ceteris paribus, than hypotheses that convey a lower probability. A view that (Clatterbuck, 2020) calls Relative Elitism. Such higher probability hypotheses can be statistically refuted faster, that is with fewer observations over some range determined by the significance level (which we can choose to be lower for higher probability assignments) as in the usual frequentist statistical testing, when unexpected evidence arrives (at least with a clopen evidential topology)²⁴.

Furthermore, these observations explain why hypothesis generation/search, in the context of discovery, is so often focused on accounting for our evidence. Basically, according to Formal Learning Theory, we want our procedure for hypothesis generation/search to output maximally simple hypotheses, and trying to generate/search for hypotheses that account for our evidence is one way to help ensure such an output (as well as helping to ensure the output's consistency with our evidence). Simply having a hypothesis generation/search procedure that outputs hypotheses that are logically consistent with our received evidence is not enough to ensure the maximal simplicity of such hypotheses.

6.1 FLT and Unification

Let us first consider the virtue of unification. It is often claimed that more unifying (explanatory) hypotheses are, ceteres paribus, better than less unifying (explanatory) hypotheses. We see as much in the writing of Charles Darwin:

 $^{^{24}}$ I suspect that this idea is the statistical analogue to the VC dimension of a hypothesis in statistical learning theory (Steel, 2009).

"As an illustration, consider an oft-cited passage from the end of the 6th edition of On the Origin of Species, in which Darwin reflects upon the nature of his "one long argument": I have now recapitulated the chief facts and considerations which have thoroughly convinced me that species have been modified, during a long course of descent, by the preservation or the natural selection of many successive slight favourable variations. I cannot believe that a false theory would explain, as it seems to me that the theory of natural selection does explain, the several large classes of facts above specified (1872: 421). The "several large classes of facts" to which Darwin refers include a) the existence of manifest anatomical similarities in the bone structure of the hand of a human, the wing of a bat, and the fin of a porpoise, and b) the existence of vestigial structures "organs bearing the stamp of inutility"—such as the useless teeth of the embryonic calf and shriveled wings of some beetles (1872: 420)." (Cabrera, 2023).

So, how does FLT account for the virtue of unification? Unification matters, according to FLT, to the extent that it makes something more falsifiable, that is, it makes something empirically simpler. Good thing that more unifying hypotheses are empirically simpler. If h unifies strictly more types of phenomena in my evidence than h', then, clearly, h is simpler than h' because h could be refuted (deductively or statistically) by strictly more types of phenomena (at least in empirical problems with a clopen evidential topology). In fact, we can view this matter as a kind of principle of total evidence for inductive reasoning.

6.2 FLT and Scope

The virtue of scope or breadth, as far as I understand it, is about the size of the domain of application of one's hypothesis. Scientific and normative models often come equipped, explicitly or implicitly, with domains of application (Weisberg, 2015) (Titelbaum, forthcoming). The larger the domain of application the larger the scope. It is often claimed that bigger-scoped hypotheses are better, ceteris paribus, than smaller-scoped hypotheses. How does FLT vindicate this virtue? It does so in the same way it vindicates the virtue of unification. Having a strictly bigger domain of application increases the falsifiability of the considered hypothesis by opening it up to possible refutation (deductively or statistically) by more kinds of evidence. In other words, bigger-scoped hypotheses are empirically simpler. In slogan form, FLT says to go big or go home. Some may argue against such a rationally required favoring of big-scoped hypotheses, claiming that such generalizations are rash or hasty (hence the informal "fallacy" of hasty generalization). My response is that such generalizations only seem rash because we know better, that is, we have evidence in favor of restricting the scope of some hypotheses. Newton was right to apply his theory of gravitation to the stars and not just restrict it to earthly matters.

We now consider one application of FLT's favoring of big-scoped/bold hypotheses. Suppose that you're exclusively on board with Bayesianism+FLT in the sense that you believe in only those requirements of rationality. Then, a natural question presents itself: Is the Bayes+FLT position a complete theory of induction and (credal) rationality? This is an inductive empirical problem, one to which we can apply FLT. FLT's answer: yes. Why? Because the completeness of a list of rational requirements is falsifiable by the discovery of a new rational requirement while the incompleteness-hypothesis is not falsifiable. In this way, we can justifiably deliver verdicts of people's rationality and not just of their irrationality, in contrast to (Titelbaum, 2014).

6.3 FLT and Ad Hocness

A hypothesis is sometimes described as ad hoc if its parameters are finely-tuned or tailored to a specific situation in such a way as to get the correct predictions. It is often claimed that less ad hoc hypotheses are, ceteris paribus, better than more ad hoc hypotheses. How does FLT vindicate such a claim? Consider a hypothesis h_D with domain of application D and a family of hypotheses h_{D_i} with respective domains of application D_i such that some h_{D_i} conflict when applied to the same domain and the $\cup_i D_i = D$. In what way, according to FLT, is h_D better than the conjunction of the h_{D_i} ? The answer has to do with being able to more easily follow the tenants of FLT. Imagine that you are uncertain of which domain of application D_i you are in, as is often the case. Then this uncertainty generates uncertainty between you and the predictions of the conjunction of the h_{D_i} . In this way, such a conjunction is able to avoid falsification by conspiratorially and ad hocly saying "Oh, guess we must of just been in a different domain of application" or "Oh, guess we must of just used the wrong parameters". This is especially true when the domains of application are overlapping or vague and a disjunction over the hypotheses is taken to apply to such parts of the domains. In such instances, h_D is empirically simpler than the collection of hypotheses h_{D_i} . We briefly consider one application of this point.

(Dorst, 2021) has recently argued against the standard objections against the dualistic/non-unified formulation of quantum mechanics, that is, the formalism that includes both the Measurement Postulate and the Schrodinger Equation as part of the theory's dynamics. He has done so on the following grounds: Yes, the dualistic formulation of quantum mechanics essentially appeals to the concept of measurement and that concept is vague, but so what? Maybe the best systematization of the laws of nature, for our purposes, is indeed vague. My response: Sure, maybe the best systematization of the laws of nature is vague. Maybe the world is complex and not simple. Maybe the world is dappled, so what? What matters to whether we should prefer it, according to FLT, is whether the vague dualistic formulation is empirically simpler than, say, the Everett Interpretation. It is not, especially around the experimental Heisenberg Cut (the quantum-to-classical transition).

6.4 FLT and Mechanism+Precision

Consider the virtues of mechanism and precision/detail, as discussed in (Cabrera, 2017). I think you get the gist... This completes our argument for FLT Hegemony.

7 Conclusion

This paper has argued for the hegemony of Formal Learning Theory over Inference to the Best Explanation by showing how IBE's virtues can be accounted for by FLT. How should a committed IBE-ist react to this development? I think they should welcome it. What we have done is justify IBE-style reasoning via FLT. The justification of such reasoning is something desired by almost all IBE-ists. Now, to be clear, we have not argued in favor of FLT in this paper, but rather just FLT's Hegemony over IBE, so we have not justified FLT, but we have justified IBE. My hope is that this paper motivates IBE-ists to turn their attention to the further development of Formal Learning Theory, if only to advance the IBE-ist's cause.

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