

The Supremacy of IBE over Bayesian Conditionalization

Seungbae Park

School of Liberal Arts
Ulsan National Institute of Science and Technology
Email nature@unist.ac.kr
ORCID <https://orcid.org/000-0001-5421-9700>

Abstract. Van Fraassen does not merely perform Bayesian conditionalization on his pragmatic theory of scientific explanation; he uses inference to the best explanation (IBE) to justify it, contrary to what Prasetya thinks. Without first using IBE, we cannot carry out Bayesian conditionalization, contrary to what van Fraassen thinks. The argument from a bad lot, which van Fraassen constructs to criticize IBE, backfires on both the pragmatic theory and Bayesian conditionalization, *pace* van Fraassen and Prasetya.

Keywords: Bayesian conditionalization, inference to the best explanation, pragmatic theory, scientific realism

Geriausio paaiškinimo išvedimo pranašumas prieš Bayeso sąlyginę tikimybę

Santrauka. Van Fraassenas savąją pragmatinę mokslinio aiškinimo teoriją paremia Bayeso sąlyginės tikimybės matu ir kartu, priešingai nei teigia Prasetya, jos patvirtinimui panaudoja geriausio paaiškinimo išvedimą (GPI). Priešingai nei mano van Fraassenas, Bayeso sąlyginės tikimybės skaičiavimas negali būti atliktas pirmiausia nepritaikius GPI. Argumentas, apeliuojantis į blogų aibę, kurį naudoja van Fraassenas kritikuodamas GPI, grįžta bumerangu į pragmatinę teoriją ir Bayeso sąlyginę tikimybę, taigi tampa argumentu prieš van Fraasseną ir Prasetyą.

Pagrindiniai žodžiai: Bayeso sąlyginė tikimybė, geriausio paaiškinimo išvedimas, pragmatinė teorija, mokslinis realizmas

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1. Introduction

Bas van Fraassen (1980: 97–157) has developed a well-known theory of scientific explanation called the *pragmatic theory*, according to which, “An explanation is an answer to a why-question” (van Fraassen 1980: 34), and “among the scientifically relevant factors, context determines explanatorily relevant ones” (van Fraassen 1980: 126). Why should we believe what the pragmatic theory asserts about scientific explanation? Van Fraassen’s (1980: 97–157) answer is that the pragmatic theory accounts for the phenomena in science called ‘asymmetries’ and ‘rejections’, while its rival theories, such as Wesley Salmon’s (1971) *causal theory*, do not. He uses inference to the best explanation (IBE) to justify the pragmatic theory. However, van Fraassen (1989) openly rejects IBE as rationally unconvincing. Therefore, he should also reject the pragmatic theory as rationally unconvincing (Park 2017, 2018a, 2019).

This line of objection to van Fraassen’s position motivates Yunus Prasetya (2022) to develop a unique way to defend van Fraassen’s position. In Section 2, I unpack his defense and then explore how it can be utilized by scientific realists. In Section 3, I distinguish between IBE and Bayesian conditionalization, and then argue that van Fraassen (1980: 97–157) does not merely perform Bayesian conditionalization on the pragmatic theory, but rather that he uses IBE to establish the pragmatic theory, contrary to what Prasetya (2022) claims. In Section 4, I argue that IBE is what makes Bayesian conditionalization possible, i.e., that we can adjust the probability of H, a hypothesis, in the light of evidence simply because H best explains evidence, contrary to what van Fraassen thinks. In Section 5, I turn van Fraassen’s (1989) critique of IBE against both the pragmatic theory and Bayesian conditionalization.

This paper will be useful to those who wonder whether one can increase the probability of his own theory while rejecting IBE, and to those who wonder whether IBE is prior to Bayesian conditionalization or vice versa.

2. Prasetya’s defense

The gist of Prasetya’s defense of van Fraassen’s position is that we should distinguish between what Prasetya (2022) calls “ampliative IBE” and “heuristic IBE.” According to Prasetya, van Fraassen rejects ampliative IBE but not heuristic IBE, and he uses heuristic IBE but not ampliative IBE to justify the pragmatic theory. Therefore, his position is internally consistent, contrary to what I (2017, 2018a, 2019) claim.

What are ampliative IBE and heuristic IBE? You use ampliative IBE when you increase the probability of H on the grounds that evidence obtains, and then you increase the degree of your belief in H on the grounds that H best explains the evidence. Prasetya states that “Someone who uses ampliative IBE will perform Bayesian conditionalization as normal, then give the best explanation a probabilistic boost post-conditionalization” (Prasetya 2022: S622). In other words, “ampliative IBE compels boosting one’s credence in the best hypothesis beyond conditionalization” (Prasetya 2022: S623). Thus, users of ampliative IBE believe that explanatory power is an epistemic virtue.

Let me turn to heuristic IBE. You use heuristic IBE when you increase the probability of H on the grounds that evidence obtains, but you do not increase the degree of your belief in H on the grounds that H best explains the evidence. To put it in Prasetya's terms, "The conclusion of IBE, on the heuristic conception, is a statement that approximates the posterior probability of H as being equal or close to $P(H/E)$ " (Prasetya forthcoming: 4). Thus, users of heuristic IBE do not believe that explanatory power is an epistemic virtue.

However, there is textual evidence that appears to be contrary to Prasetya's interpretation of van Fraassen's position (Park 2022a: 313–315). Van Fraassen states that the pragmatic theory "explains the tension we feel in the paresis example" (van Fraassen 1980: 128). I note that he uses the term 'explain' to describe the relationship between the pragmatic theory and the phenomena in science. It appears therefore that van Fraassen takes explanatory power to be an epistemic virtue in the context of justifying the pragmatic theory.

Prasetya (2022: S624–S626) replies that, in that context, van Fraassen does not presuppose that explanatory power is an epistemic virtue, and that, in other passages, van Fraassen uses other expressions, such as "account for," "accommodate," and "save phenomena," to characterize the relationship between evidence and the pragmatic theory. Those terms are ambiguous, or they indicate that van Fraassen uses heuristic IBE but not ampliative IBE.

What do other writers say about van Fraassen's epistemic attitude toward IBE? James Ladyman et al. interpret van Fraassen as asserting that "the rule of IBE is unacceptable in general" (Ladyman et al., 1997: 312). They say so in the context of responding to Stathis Psillos's (1997) critique of van Fraassen's position. Psillos interprets van Fraassen as asserting that IBE is acceptable when H is about observables, although it is rejectable when it is about unobservables. According to Ladyman et al., van Fraassen takes IBE as rejectable whether H is about observables or unobservables. Accordingly, they would say that van Fraassen rejects both ampliative IBE and heuristic IBE.

Prasetya could point out that Ladyman et al. are arguing within the context of the debate over whether IBE is acceptable when H is about observables, and then he could argue that if they were within the context of the debate over whether ampliative IBE and heuristic IBE are acceptable, they would say that van Fraassen accepts heuristic IBE but rejects ampliative IBE. Thus, Prasetya could interpret van Fraassen as asserting that heuristic IBE is acceptable whether H is about observables or unobservables, while ampliative IBE is rejectable whether H is about observables or unobservables.

This possible interpretation of van Fraassen's position implies that the crucial factor that we should take into account when we take our epistemic attitude toward H is not whether H is about observables or unobservables, but rather whether the IBE used to arrive at H is ampliative or heuristic. There can be an interesting debate between proponents of ampliative IBE and those of heuristic IBE. However, I do not explore that debate in this paper. I only criticize the common presupposition of both ampliative IBE and heuristic IBE in Section 4 below.

What can we conclude from Prasetya's interpretation that van Fraassen uses not ampliative IBE but rather heuristic IBE to justify the pragmatic theory? We can conclude,

according to Prasetya, that “since van Fraassen does not reject Bayesianism, his argument for the contextual theory is not undermined by his rejection of ampliative IBE” (Prasetya 2022: S626). I take this conclusion to imply that van Fraassen arrives at the pragmatic theory through Bayesian conditionalization, i.e., that he increases the probability of the pragmatic theory, say, to 90% in the light of asymmetries and rejections.

In my view, scientists would welcome Prasetya’s defense of van Fraassen’s position. They use IBE to justify their theories. Darwin states, for example, that “we can clearly understand these analogies, if species have once existed as varieties, and have thus originated: whereas, these analogies are utterly inexplicable if each species has been independently created” (Darwin 1859/1993: 146). Appealing to Prasetya’s defense of van Fraassen’s position, Darwin could say that he does not use ampliative IBE but rather heuristic IBE, and that just as van Fraassen believes the pragmatic theory through Bayesian conditionalization, so Darwin believes the evolutionary theory through Bayesian conditionalization.

Critics might object that Darwin uses ‘explain’ in his argument for evolutionary theory, and thus that he uses ampliative IBE, while van Fraassen uses ‘account for’, ‘accommodate’, and ‘save phenomena’ in his argument for the pragmatic theory, and thus he uses heuristic IBE. In response, Darwin could replace ‘explain’ with ‘save phenomena’ in his argument for evolutionary theory, and then say that he uses not ampliative IBE but rather heuristic IBE, just as van Fraassen does.

Realists, who are sympathetic to the no-miracles argument (Putnam 1975: 73), would also welcome Prasetya’s defense of van Fraassen’s position. The gist of the argument is that realism best explains the success of science. Arthur Fine (1991: 82) and Larry Laudan (1981: 45) object that the argument begs the question against antirealists who reject IBE. Drawing on Prasetya’s defense of van Fraassen’s position, realists could reply that the argument does not use ampliative IBE but rather heuristic IBE, and that they believe realism through Bayesian conditionalization.

This section can be summed up in the following dilemma against van Fraassen. He can either agree or disagree with Prasetya’s defense of his position. If he agrees with it, he can believe the pragmatic theory, but he should also believe H, thereby giving up antirealism. If he disagrees with it, he can reject H, but he should also reject the pragmatic theory. I dare say that the pragmatic theory and scientific theories are in the same boat. If we accept the pragmatic theory, we should also accept H, and if we reject H, we should also reject the pragmatic theory.

3. Really IBE?

3.1. *Explainers vs. Adjusters*

In this subsection, I distinguish between two kinds of cognitive agents: explainers and adjusters. This distinction paves the ground for the discussion in the next subsection where I argue that van Fraassen does not merely perform Bayesian conditionalization on the pragmatic theory, but that he rather uses IBE to justify the pragmatic theory.

Suppose that scientists encounter puzzling phenomena, e.g., that human embryos have gills. They *develop* the hypothesis that human beings have descended from fish. They *explain* embryological phenomena in terms of the hypothesis, i.e., they say, “Human embryos have gills because human beings have descended from fish.” When they say so, they have the intention to *provide* their audience with an insight into embryological phenomena, and they *believe* that human embryos have gills because human beings have descended from fish. Developing, explaining, providing, and believing are first-order activities. Thus, scientists are first-order agents, which implies that they are developers, explainers, providers, and believers.

When scientists explain something, they ought to believe their explanation. If they do not, they might run into three problems: the problem of deceptive speech acts, Moore’s paradox, and the problem of disconcerting questions (Park 2018b, 2020: 180, 2022b: 50–54). Just imagine what would happen in court if a judge said something that he does not believe. He says, for example, “I hereby sentence you to death” to a defendant whom he believes is not guilty! Such a speech act is irresponsible and unethical. Due to such problems, I wrap up my earlier paper with the slogan: “Science is a serious enterprise” (Park 2020: 183).

When scientists say “Human embryos have gills because human beings have descended from fish,” philosophers of science might adjust the probability of the hypothesis in accordance with Bayes’ theorem. As a result of the adjustment, they might believe that the posterior probability of the hypothesis is 90% or 20%. If they believed that the posterior probability of the hypothesis is 90%, they would believe that the hypothesis is true¹. If they believed that the posterior probability of the hypothesis is 20%, they would not believe that the hypothesis is true. When they do these things, they are not developing any hypothesis, and they are not explaining any phenomena, nor do they have the intention to provide their audience with any insight into embryological phenomena. (It is not even clear whether an audience is required.) They are merely taking an epistemic attitude toward the existing hypothesis. Taking an epistemic attitude is a second-order activity. Consequently, philosophers of science are second-order agents, which means that they are adjusters, but not developers, not explainers, not providers, and not necessarily believers.

Just as scientists explain natural phenomena, so philosophers of science explain scientific phenomena. Suppose that philosophers of science encounter puzzling phenomena in science, e.g., asymmetries and rejections. They *develop* a theory of scientific explanation. They *explain* asymmetries and rejections in terms of the theory of scientific explanation. They say, for example, “It is legitimate to explain the height of a building by the length of its shadow in a certain context because context determines which factor is relevant to a why-question.” When they say so, they explain asymmetries, and they have the intention to *provide* their audience with an insight into asymmetries, i.e., they have the intention to reveal an underlying mechanism behind asymmetries, and they *believe* that it is legitimate

¹ This contention goes hand in hand with Alvin Goldman and Bob Beddor’s view that the probability of a justified belief is “greater (presumably quite a bit greater) than .50” (Goldman and Beddor 2016).

to explain the height of a building by the length of its shadow in a certain context because context determines which factor is relevant to a why-question. Developing, explaining, providing, and believing are first-order activities. Accordingly, philosophers of science are first-order agents, which means that they are developers, explainers, providers, and believers.

Suppose that some scientists who are interested in philosophy of science update the probability of the pragmatic theory in light of asymmetries and rejections with the use of Bayes' theorem. As a result of the updating, they might believe that the posterior probability of the pragmatic theory is 90% or 20%. If they believed that the posterior probability of the pragmatic theory is 90%, they would believe that it is true. If they believed that the posterior probability of the pragmatic theory is 20%, they would not believe that it is true. When they do these things, they are not developing any hypothesis, and they are not explaining anything, nor do they have the intention to provide their audience with any insight into asymmetries and rejections. They are merely taking an epistemic attitude toward the pragmatic theory. Taking an epistemic attitude is a second-order activity. Hence, the scientists are second-order agents, which means that they are adjusters, but not developers, not explainers, not providers, and not necessarily believers.

3.2. *Van Fraassen's use of IBE*

Does van Fraassen (1980: 97–157) act like an explainer or an adjuster in the context of justifying the pragmatic theory? In other words, does he explain asymmetries and rejections? Or does he merely adjust the probability of the pragmatic theory?

My answer is that van Fraassen acts like an explainer rather than like an adjuster. He develops a new theory of scientific explanation, just as scientists develop new scientific theories. He explains asymmetries and rejections exactly in the way scientists explain natural phenomena. He has the intention to provide his audience with an insight into asymmetries and rejections, just as scientists have the intention to provide their audience with an insight into natural phenomena (Park 2022a: 313–315). In addition, he believes the pragmatic theory. As noted earlier, van Fraassen asserts that “An explanation is an answer to a why-question” (van Fraassen 1980: 134), and “among the scientifically relevant factors, context determines explanatorily relevant ones” (van Fraassen 1980: 126). Such assertions can be advanced by those who believe the pragmatic theory, but not by those who need not.

The interpretation that van Fraassen acts like an adjuster rather than an explainer faces the following four objections: (i) The interpretation overlooks his theoretical achievement, viz., the development of the pragmatic theory. The pragmatic theory is an original theory of scientific explanation. It requires far more creativity to develop such a theory and to explain puzzling phenomena than merely to adjust the probability of an existing theory.

(ii) The interpretation overlooks van Fraassen's intention to provide his audience with an insight into asymmetries and rejections, i.e., his intention to reveal an underlying mechanism behind asymmetries and rejections. Asymmetries and rejections initially ap-

pear to be different kinds of phenomena, but, thanks to the pragmatic theory, they appear to be the same kind of phenomena. In short, the pragmatic theory “unifies rejections and asymmetries” (Park 2022a: 316–319).

(iii) The interpretation runs the risk of overlooking the impact that the pragmatic theory has on his audience. If van Fraassen is merely an adjuster, he need not believe his theory. If he need not believe his theory, his audience need not believe it, either. As a result, his audience need not be relieved of the puzzlement over why asymmetries and rejections occur, i.e., they might still be puzzled over why asymmetries and rejections occur.

(iv) The interpretation goes contrary to the fact that van Fraassen (1980: 97–157) does not even mention Bayes’ theorem, to say nothing of using it. Carrying out Bayesian conditionalization requires using Bayes’ theorem. However, he is silent about the likelihood of the pragmatic theory, the prior probability of the pragmatic theory, and the probability of asymmetries and rejections, all of which are needed to determine the posterior probability of the pragmatic theory.

Without using Bayes’ theorem, van Fraassen (1980: 97–157) concludes that the pragmatic theory is true. The premise for his conclusion is that the pragmatic theory best explains asymmetries and rejections. In short, he is not merely an adjuster but rather an explainer when it comes to the pragmatic theory.

3.3. *Prasetya’s conception of IBE*

In this subsection, I closely analyze Prasetya’s definitions of ampliative IBE and heuristic IBE. I argue that, on close analysis, they are not IBE, but rather they are adjusting activities.

Prasetya says: “Someone who uses ampliative IBE will perform Bayesian conditionalization as normal, then give the best explanation a probabilistic boost post-condition-alization” (Prasetya 2022: S622). He also suggests that the conclusion of heuristic IBE “is a statement that approximates the posterior probability of H as being equal or close to $P(H/E)$ ” (Prasetya forthcoming: 4). I note that, on these definitions, users of ampliative IBE and heuristic IBE are merely adjusting the probability of H. They are not developing H. They are not explaining anything. They have no intention to provide their audience with an insight into phenomena. They need not believe that H is true. In short, they are adjusters, but not developers, not explainers, not providers, and not necessarily believers.

On Prasetya’s definitions, ampliative IBE and heuristic IBE are not activities of explaining phenomena, but rather activities of adjusting the probabilities and/or degrees of beliefs. Accordingly, ‘ampliative IBE’ and ‘heuristic IBE’ are misnomers. ‘Ampliative adjustment’ and ‘heuristic adjustment’ are the right nomenclatures. ‘Ampliative IBE’ and ‘heuristic IBE’ mislead unwary readers into thinking that the terms refer to the activity of explaining when, in fact, they refer to the activity of adjusting the probability of H. From now on, I shall use ‘heuristic adjustment’ and ‘ampliative adjustment’ instead of ‘heuristic IBE’ and ‘ampliative IBE’.

I (2017, 2018a, 2019) have IBE rather than ampliative and heuristic adjustments in mind when I claim that van Fraassen uses IBE to justify the pragmatic theory. Van Fraassen

asserts “that his theory is true because it explains rejections and asymmetries whereas the aforementioned rival theories cannot” (Park 2017: 61). This interpretation receives support from what I said in Subsection 3.2 above, namely that van Fraassen develops the pragmatic theory, explains asymmetries and rejections, has the intention to provide his audience with an insight into asymmetries and rejections, and believes the pragmatic theory.

Of course, van Fraassen and Prasetya are welcome to continue using ‘IBE’ to refer to the activities of adjusting the probability of H and/or the degree of belief in H in the light of evidence. After all, the activities are about the product of IBE, and thus they are somehow related to IBE. In case they stick to ‘IBE’, however, I ask readers to bear in mind that what they mean by IBE substantially differs from what I mean by IBE.

4. IBE-supremacism

In this section, I explore the relationship between IBE and Bayesian conditionalization, arguing that IBE is what makes Bayesian conditionalization possible, i.e., that we cannot adjust the probability of H without first using IBE, contrary to what van Fraassen thinks.

When does the probability of H increase? Under what conditions can we increase the probability of H? Ampliative and heuristic adjusters have different answers to these questions. According to ampliative adjusters, the probability of H increases under the condition that evidence obtains and/or under the condition that H explains evidence, but, according to heuristic adjusters, the probability of H increases only under the condition that evidence obtains. Ampliative adjusters believe, while heuristic adjusters do not, that explanation increases the probability of H. However, ampliative and heuristic adjusters commonly believe that the probability of H can increase even if H does not explain anything, and thus that H can have a non-zero probability even before H explains anything. In this respect, their views are fundamentally different from those of the users of IBE.

The users of IBE believe that explanation is a means to increase the probability of H. If the probability of H increases, that is because H explains something. This view goes hand in hand with Carl Hempel’s (1966: 48) view of scientific explanation, according to which, one of the differences between scientific explanations and nonscientific explanations (e.g. superstitious explanations) is that an explanans provides support for an explanandum in a scientific explanation but not in a nonscientific explanation. For Hempel, explanation and support are inseparable from each other; where there is an explanatory relationship, there is a supporting relationship.

Let us ask the following question to the adjusters and to the users: on what grounds do you increase the probability of H in the light of evidence? For example, on what grounds do you increase the probability of the evolutionary theory in the light of embryological phenomena? What is the reason for thinking that embryological phenomena increase the probability of the evolutionary theory? This question would disconcert the adjusters but not the users. The adjusters would unwillingly answer that it is a brute fact that embryological phenomena increase the probability of the evolutionary theory. By contrast, the users would readily answer that embryological phenomena increase the probability of the

evolutionary theory because the evolutionary theory explains them. As far as the users are concerned, it is mysterious how embryological phenomena increase the probability of the evolutionary theory if the evolutionary theory does not explain them, how the perihelion motion of Mercury increases the probability of the general relativity if the general relativity does not explain it, and so forth.

Laypeople do not increase the probability of the general relativity when they observe the perihelion motion of Mercury because they do not see the explanatory relationship between them. By contrast, physicists increase the probability of the general relativity when they observe the perihelion motion of Mercury because they see the explanatory relationship between them. This difference between laypeople and experts indicates that phenomena increase the probability of H because H explains them.

Let us pose another question to the adjusters and the users: how do you calculate the difference between the prior and the posterior probabilities of H? The adjusters would answer that they do it in accordance with Bayes' theorem: $P(H|E)=P(E|H)P(H)/P(E)$. An immediate objection to this answer is to ask how they estimate $P(E|H)$, $P(H)$, and $P(E)$ without first using IBE. They might answer that they do it with the use of the background hypotheses, the hypotheses that we have already accepted. This possible answer, however, only pushes the question back. Where did you get the background hypotheses? Heuristic adjusters cannot answer that they acquired the background hypotheses with the use of IBE, for this answer goes against their view that IBE does not increase the probability of H at all. Ampliative adjusters cannot give the answer, either, because it admits that they cannot increase the probability of H without first using IBE. By contrast, the users can happily answer that they acquired the background hypotheses with the use of IBE. As far as they are concerned, IBE is the only means to establish the background hypotheses and to increase the probability of H.

What can we learn from the foregoing discussion? Explanation is what endows phenomena with evidential power, i.e., phenomena count as evidence for H simply because H explains them. It follows that it is IBE what makes Bayesian conditionalization possible. Without first using IBE, we cannot update the probability of H in the light of evidence. This observation of the relationship between IBE and Bayesian conditionalization leads to the view that I call 'IBE-supremacism', according to which, IBE is prior to Bayesian conditionalization.

Ironically, IBE-supremacism would be endorsed by Prasetya. He puts forward the following statements in the context of cashing out how the adjusters can perform Bayesian conditionalization on van Fraassen's contextual theory (CT):

- (1) CT explains E. That is, $P(E|CT)$ is high.
- (2) CT's rival,s fail to explain E. That is, $P(E|\sim CT)$ is low and less than $P(E|CT)$.
- (3) Therefore, $P(CT|E) > P(CT)$. (Prasetya 2022: S623)

I note that the term 'explain' figures in both (1) and (2), and that (3) is the conclusion from (1) and (2). (1) and (2) imply that a statement about an explanatory relationship is

equivalent to a statement about a probability. (3) implies that a statement about a probability can be drawn from statements about explanatory relationships. (1), (2), and (3) jointly imply that IBE is needed to carry out Bayesian conditionalization, which is exactly what IBE-supremacism asserts.

Why does Prasetya appeal to the notion of explanation in the context of carrying out Bayesian conditionalization? My answer is that IBE-supremacism is hard-wired in our minds. Prasetya could not resist, I hypothesize, the strong intuition that if *H* explains phenomena, its probability goes up. Prasetya is similar to van Fraassen on this count. Van Fraassen could not resist, I hypothesize, the strong intuition that since the pragmatic theory best explains asymmetries and rejections, it is true.

5. The argument from a bad lot

Van Fraassen (1989) advances the argument from a bad lot to show that IBE is not compelling. In this section, I argue that it backfires on the pragmatic theory whether van Fraassen uses IBE to justify it or heuristically adjusts the probability of it, i.e., whether I am right or Prasetya is right about van Fraassen's position.

Let me first introduce the argument from a bad lot. Its premise is that the set of formulated rival hypotheses might not include a true hypothesis, i.e., that *H* "may be the best of a bad lot" (van Fraassen 1989: 143). Its conclusion is that "the best of set *X* will be more likely to be true than not, requires a prior belief that the truth is already more likely to be found in *X*, than not" (van Fraassen 1989: 143). To put it differently, users of IBE are required to show that it is more likely that truth is in the set of formulated rival theories than not.

Let me apply the argument from a bad lot to the pragmatic theory. There might be unformulated theories of scientific explanation. Consequently, van Fraassen's conclusion that the pragmatic theory is true requires the prior belief that it is more likely that the true theory of scientific explanation is in the set of the formulated rival theories, such as the causal theory, than not (Park 2021: 5). So far as I know, van Fraassen has not even attempted to justify the prior belief.

The argument from a bad lot makes Bayesian conditionalization futile and pointless. The pragmatic theory might be the best of a bad lot, no matter how highly van Fraassen increases its probability through Bayesian conditionalization. Consequently, increasing its probability through Bayesian conditionalization does not relieve van Fraassen of the burden of justifying the prior belief that the true theory of scientific explanation is more likely to be in the collection of formulated rival theories of scientific explanation than not. In the absence of the justification for the prior belief, no one is justified in believing the pragmatic theory.

In this section, I have turned the argument from a bad lot against the pragmatic theory. However, I do not claim that the argument from a bad lot is sound or cogent. I rather claim that it is a double standard to apply it to *H* but not to the pragmatic theory.

6. Conclusion

If heuristic adjustment compels van Fraassen to believe the pragmatic theory, it also compels him to believe H. Van Fraassen does not merely heuristically adjust the probability of the pragmatic theory, but rather he uses IBE to justify the pragmatic theory, contrary to what Prasetya thinks. IBE is what makes Bayesian conditionalization possible, contrary to what van Fraassen thinks. Finally, van Fraassen's argument from a bad lot backfires on both the pragmatic theory and Bayesian conditionalization. I would be happy to give up IBE-supremacism if the defenders of van Fraassen's position showed that the argument from a bad lot spells trouble for IBE but not for Bayesian conditionalization, or else if they came up with a new argument which spells trouble for IBE but not for Bayesian conditionalization. This paper has the following slogan: "IBE is prior to Bayesian conditionalization."

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