Is the Bad Lot Objection Just Misguided?

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Abstract   In this paper, I argue that van Fraassen's "bad lot objection" against Inference to the Best Explanation [IBE] severely misses its mark. First, I show that the objection holds no special relevance to IBE; if the bad lot objection poses a serious problem for IBE, then it poses a serious problem for any inference form whatever. Second, I argue that, thankfully, it does not pose a serious threat to any inference form. Rather, the objection misguidedly blames a form of inference for not achieving what it never set out to achieve in the first place.

1 The Bad Lot Objection and Retrenchment

Inference to the Best Explanation [henceforth, IBE] is a form of uncertain inference that has us infer the truth of a hypothesis from the judgment that that hypothesis proffers the best of the available, competing potential explanations of the evidence. Few uncertain inference forms hold as much intuitive plausibility and wide applicability to actual human reasoning as IBE. IBE arguably constitutes the dominant mode of inference at work in cases of human reasoning ranging from medical diagnosis to forensics to auto repair; and conclusions reached by IBE within these fields tend to be above reproach. Nonetheless, philosophers have found reasons to doubt the general cogency of IBE.

   If there is one objection in particular that is most commonly believed to put into doubt IBE's merits as an inference form, it is the so-called "bad lot objection". Bas van Fraassen (1989, pp. 142–143) gives the classic statement of this objection:

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> [IBE] selects the best among the historically given hypotheses. We can watch
> no contest of the theories we have so painfully struggled to formulate, with
> those no one has proposed. So our selection may well be the best of a bad lot.
> To believe is *at least* to consider more likely to be true, than not. […] For me
> to take it 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.

Stated in other words, van Fraassen's criticism is that the value of any inference to
the best explanation will be constrained by that of the lot of considered hypotheses. If
this lot does not include a true hypothesis, then IBE will inevitably recommend to us
a false belief. There are any number of hypotheses that could potentially explain the
evidence in question, more than we could plausibly be expected to consider or even
think up in the first place. But then the true hypothesis may be one of the countless
explanatory hypotheses that we are not presently considering. IBE presumes a
collection of hypotheses to be considered; it does not involve any inference to such
a collection. As such, it gives us no reason to think that we are not starting off with a
bad lot (a collection of explanatory but false hypotheses). Consequently, it can hardly
be trusted as a reliable inferential vehicle for attaining true beliefs.

To a large extent, the last few decades of debate over IBE's merits have been
shaped by the bad lot objection.[1] In its wake, many contemporary philosophers give
up on the standard "textbook" model of IBE, maintaining for example that the bad
lot objection reveals IBE to be "manifestly defective" (Douven 2011, section 2; see
also Douven 2002) or "implausible on its face" (Gabbay and Woods 2005, p. 102).
In attempting to salvage some tenable core of IBE from this objection, such
philosophers have retrenched by putting forward more modest, and thereby more
defensible, formulations of explanatory inference. Lipton, for one, requires that the
premises of an explanatory inference should include not only the judgment that the
hypothesis being singled out is the best explanation of the lot, but also that it is
"sufficiently good" (Lipton 2004, p. 93; see also Lipton 1993). Similarly, Musgrave
(1988, pp. 238–239) requires that the hypothesis ought to be "satisfactory" in
addition to being the most explanatory.

Instead of strengthening IBE's premises, other philosophers weaken its
conclusion. For Kuipers, a plausible account of explanatory inference will not
license an outright inference to the most explanatory hypothesis of the lot, but rather
an inference to the conclusion that the most explanatory of the competing
hypotheses is "closer to the truth" than any of its competitors (Kuipers 1992,
pp. 310–311; see also Kuipers 2000). Gabbay and Woods (2005, pp. 101–102)
demur from IBE and instead focus on on a notion of abduction that is "ignorance-
preserving", leading us not to the acceptance of the best explanation H, but instead
to the conclusion that "It is permitted to conjecture that H" (p. 69).[2]

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[1] The following brief survey of responses to the bad lot objection is adapted from Douven (2011).

[2] Magnani (2009) likewise focuses on a distinct, ignorance-preserving notion of abduction, and he offers
a helpful discussion of how this notion relates to IBE. In short, Magnani maintains that IBE adds to
abduction an ignorance-reducing, inductive step: "[IBE] cannot be a case of abduction, because abductive
inference is constitutively ignorance preserving. In this perspective the inference to the best explanation
also involves— for example—the generalizing and evaluating role of induction" (p. 68).

This paper reconsiders the bad lot objection. Rather than responding to this objection by putting forward yet another reformulation of explanatory inference, I attempt to defang van Fraassen's objection. Specifically, what I attempt to show in this paper is that IBE (i.e., explanatory inference as classically formulated) requires no defense against the bad lot objection. This is because that objection is misguided in at least two different ways. In Sect. 2.1, I argue that the unfortunate possibility that the bad lot objection exploits is a possibility that arises with regards to any inference form whatever—even deductive inference forms. Thus, if the bad lot objection is a worry for proponents of IBE, then it is a worry for proponents of any inference form. In Sect. 2.2, I argue that thankfully there is good reason to think that the objection need not worry anyone—at least insofar as it is supposed to pose a problem for an inference *form*. If I am right, then three decades of dialectic inspired by the bad lot objection have, to some extent, muddied the debate over the cogency of IBE. In Sect. 3, I consider and argue against two possible responses on behalf of IBE's critics. Section 4 concludes by clarifying the upshot of all of this to current research on IBE.

2 Why the Bad Lot Objection is Misguided

2.1 The Bad Lot Objection Generalized

My answer to the bad lot objection turns on the basic distinction between the form of an inference and the material content that we bring to the inferential table whenever our reasoning actually instantiates an inference form. The *form* of an inference is, loosely speaking, a general pattern that the inference instantiates and which it shares with other inferences; the *material content* includes the particular statements, concepts, etc. used to instantiate an inference form, thereby producing an inference. To take a simple example, which is all we will need for the sake of this paper, a particular inference may go as follows:

Either Bill is drunk or he's stupid.

Bill isn't stupid.
∴ Bill is drunk.

The pattern or form that this inference most clearly instantiates is that of disjunctive syllogism:

Either p or q

Not q
∴ p

And the material content that this instance of disjunctive syllogism brings to the table includes the specified premises and conclusion ("Bill is drunk or he's stupid", "Bill isn't stupid", "Bill is drunk") along with the concepts expressed therein.

We may, of course, apply this same distinction to IBE. A particular instance of this inference form might go as follows:

It's late at night, and Bill has just come home; he's bumbling about, knocking things over, and he cannot pronounce a single word without slurring.

Among the available, competing explanatory hypotheses {h_1: Bill is drunk, h_2: Bill has very recently developed a cognitive disorder, h_3: Bill is pretending to be drunk}, h_1 proffers the best potential explanation of Bill's behavior.
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$\therefore h_1$: Bill is drunk.

The pattern or form that this inference most obviously instantiates is that of IBE:

e
Among the available, competing explanatory hypotheses $\{h_1, h_2, \ldots, h_n\}, h_i$ proffers the best potential explanation of e.
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$\therefore h_i$

And the material content that this instance of IBE brings to the table includes the specified premises and conclusion, along with all of the concepts expressed therein. In particular, this material includes the lot of hypotheses to be considered. In no sense are the particular hypotheses to be considered part of the inferential form; the lot of hypotheses to be considered manifestly changes between IBE's instances.

With this distinction in mind, van Fraassen's objection can be rephrased as the worry that since the form of IBE does not give us any reason to think that we have brought good material content to the inferential table, it cannot be trusted as a reliable mode of inference at all. Phrased in the way, it is unclear why anyone would suppose that the bad lot objection poses a problem for IBE specifically. The objection is not of particular relevance to IBE; one can run such an objection to any form of inference whatever, be it nondeductive or deductive. If, for example, one brings a "bad lot" of premises to the inferential table, then modus ponens will likely commend to us a false conclusion. Moreover, modus ponens itself provides us with no reason to believe that we will instantiate it with true premises. The same point holds for *any* inference form: by virtue of their formal character, they provide us with few constraints on the quality of the material that may be used to instantiate them on any occasion. But when working with bad material content, virtually any inference form will likely commend a false conclusion.[3] Seen in this way, van Fraassen's objection merely points to the garbage in/garbage out, abstract character of all forms of inference. If the bad lot objection causes trouble for IBE, it causes trouble for all inferential forms.

2.2 How Not to Evaluate an Inference Form

The bad lot objection thus presents no challenge to IBE specifically. It exploits the fact that inference forms do nothing to prevent us from compromising their reliability by instantiating them with bad material (e.g., bad lots of hypotheses).

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[3] Here, we are ignoring some degenerate forms of inference—e.g., ones that specify the form of a tautology (like "$p \vee \neg p$") in the conclusion.

Furthermore, this criticism not only is generalizable, but it also clearly seems correct. Are we thus to conclude that no form of inference whatever can provide us with a reliable means of "forming warranted new beliefs on the basis of the evidence" (van Fraassen 1989, p. 142)?

Thankfully, the answer is no. And the reason is because the bad lot objection (at least when aimed at an inferential *form*) is misguided from the start. It is misguided because it faults inferential forms for not doing what they are in no position, and make no claims, to do. When evaluating any inference form, we do not ask whether that form somehow guarantees the quality of the material content that we plug into it on any particular occasion. In and of itself, a decidedly cogent inference form may indeed give us no reason at all to expect that we will instantiate it with good material. Rather, we ask whether or not that inference form in some sense *preserves* good material content. Accordingly, to take an example, we do not fault modus ponens for failing to secure true premises reliably amongst its instantiations. Instead, if we are fairly evaluating the inference form, we ask after the truth-preserving character of the inference form. We ask whether the truth of the conclusion is guaranteed by the truth of the premises—with questions as to whether the actual premises fed into that inference form on any particular occasion are true set aside. In the case of modus ponens—assuming the classical semantics—the inferential form is indeed truth-preserving. And it is in this sense that we can say that it gives us an objective rule for forming warranted new beliefs based upon the evidence.

When evaluating nondeductive forms of inference, we again ask whether or not the inference form reliably preserves good material content. Of course, unlike their deductive siblings, nondeductive inference forms make no claim to preserving truth perfectly, and so it is unfair to fault them for not doing so; to do so is to fault nondeductive inference forms for not being deductive. Minimally, what they *do* claim is that their conclusions are positively supported to some extent in all of those cases where the form is instantiated with good material content. This claim may be explicated in any number of ways contingent upon what is meant by "positive support". As an example, someone who identifies positive support with probabilistic confirmation will evaluate a nondeductive inference form by asking whether bringing true premises and otherwise epistemically valuable material content to the inferential table does anything to increase the probability that the conclusion is true—with questions as to the value of the material content that one brings to any particular instance of the inference form set aside. Importantly, just as in the deductive case, it poses no threat to a nondeductive inference form to observe that the form itself does nothing to prevent us from instantiating it with false premises and other epistemically adverse content. Returning to the bad lot objection then, one cannot fairly criticize IBE as a form of nondeductive inference by noting that it does not preclude us from compromising its reliability by considering a bad lot of hypotheses. Van Fraassen is correct to point out that IBE gives us no reason to believe that we are considering lot of hypotheses that contains the truth. However, it is wrong to think that it should; that is simply not its job as an inference form.

Here is another way of seeing why the bad lot objection is misguided. Consider the following general question: why does it make sense to evaluate logical forms

under the assumption that we are working with good material content? Why, for example, ought we assume the truth of an argument's premises when evaluating its form? Of course, in order to demonstrate validity, we must prove that *if* the argument's premises *are* true, then so must be its conclusion (and we use a parallel strategy for proving inductive cogency). The assumption in question then is the first step in a metalogical, conditional proof of validity. There is, however, a deeper and more satisfying rationale for why we should assume that we are working with good material content in formal evaluations: if we do not control for the quality of the material that we are putting into our inference form, then we are allowing material defects to confound our formal evaluations. Simply put, it is unfair to fault an inference form for potential problems pertaining to material we may feed that form. This rationale justifies our assuming the truth of our premises in formal evaluation; more generally, it justifies our assuming the good quality of any and all material content that has a bearing on the logical merits of our inference. But then the problem with the bad lot objection is that it allows material defects (potential problems having to do with the lot of hypotheses used in instantiating IBE) to confound our formal evaluation of IBE.

To summarize, the bad lot objection faults IBE for not giving us reason to believe that the lot of available hypotheses it considers is good (i.e., contains a true hypothesis). A general form of this objection can equally well be put to any inference form insofar as inferential forms, by their very nature, do not require or even encourage us to instantiate them in any particular way (e.g., with only true premises). But then the bad lot objection is manifestly misguided; it faults IBE (and other inference forms when generalized) for not achieving something it never set out to achieve in the first place—namely, ensuring that we instantiate it with good material content. The bad lot objection to IBE is misguided because it effectively allows the possibility of material defects to confound our evaluation of an inference form.

3 Salvaging the Bad Lot Objection

I can see two ways for IBE's critics to respond to the above. First, they may plausibly want to do their own bit of retrenching. Even if the bad lot objection is misguided when directed at any inferential form, one might insist that it carries its negative force against particular inferences. Van Fraassen, for one, has specific philosophical targets in mind when he puts forward his objections to IBE—namely, scientific realists of various sorts. And so one might argue: while the bad lot objection misfires when aimed generally at IBE qua inferential form, it lands a devastating blow when aimed more narrowly at those inferences to the best explanation that such realists employ.

According to this more modest version of the bad lot objection, the problem with IBE is not its form. The problem rather has to do with the material content that philosophers of a certain sort are inclined to plug into IBE when involved in a particular debate. In other words, IBE may well be a defensibly reliable mode of inference, assuming that we are feeding it good material (including a good lot of hypotheses); however, the realist inevitably comes to the inferential table with bad

material (a bad lot of hypotheses). This more modest version of the bad lot objection coheres well with some of the things that van Fraassen writes.[4] Thus, for example, the following passage provides reason to believe that the realist will inevitably instantiate IBE with bad lots of hypotheses:

> I believe, and so do you, that there are many theories, perhaps never yet formulated but in accordance with all evidence so far, which explain at least as well as the best we have now. Since these theories can disagree in so many ways about statements that go beyond our evidence to date, it is clear that most of them by far must be false. I know nothing about our best explanation, relevant to its truth-value, except that it belongs to this class. So I must treat it as a random member of this class, most of which is false. Hence it must seem very improbable to me that it is true (1989, p. 146).

The bad lot objection looks to be much more compelling when it is reined in in this way. Van Fraassen, of course, is a prominent voice in a long line of philosophers critical of scientific realism. Such philosophers have effectively put forward compelling reasons to think that the philosophical hypotheses that realists consider are dubious; they have thereby effectively put forward multiple compelling reasons to think that realists consider bad lots of hypotheses. To respond to this version of the bad lot objection then, realists would have to defend their philosophical commitments. All of this takes us directly into the realism debate in the philosophy of science. I do not wish to rehearse this debate here and now and thereby turn this into a paper on scientific realism. Thankfully, I do not need to. For the sake of this paper, it suffices to point out that I would have to do exactly this (i.e., enter into the realism debate) were I to attempt to respond to this retrenched version of the bad lot objection.

   Whether or not this objection works against certain instances of IBE, it has no negative force against the inference form of IBE. One should not doubt the validity of modus ponens upon seeing somebody plug a false premise into it. Nor indeed are we compelled to do so upon observing some group of philosophers systematically plugging false premises into it. In the same way, the problem in this case (if this retrenched version of the bad lot objection is correct) is not with the form of inference that realists are using, but with the material that they feed into the inference form. Trying to salvage the bad lot objection in this way then shifts the focus of the objection; this is no longer an objection to IBE, but rather an objection to the realist's choice of which hypotheses to consider. Ultimately, this is nothing

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[4] Thus, a case can be made that van Fraassen sometimes has this more modest version of the objection in mind. If this is correct, however, it seems that he flips back and forth between the stronger and weaker formulations of the bad lot objection. For example, in his most in-depth discussion of the issue (1989, chap. 6—see especially sections 4 and 5), van Fraassen considers some responses to the bad lot objection. One of these (the "privilege" response) constitutes an attempted defense of the hypotheses that we humans tend to consider when we infer the best explanation. As such, this response seems to make better sense if one reads the objection as a challenge to the goodness of the material content that we plug into IBE in certain instances. But another response ("retrenchment") arguably only makes sense if one reads the bad lot objection as posing a problem for IBE qua inferential *form*. Meanwhile, all of this takes place in a section where van Fraassen is interested in attacking what he variously describes as "the epistemological *scheme* of IBE", "this *pattern* of inference, to the best explanation offered", and IBE in its putative role as "a *rule* to form warranted new beliefs on the basis of the evidence".

more than an objection to the realist's inclination to consider the realist hypothesis and not to consider others (e.g., van Fraassen's constructive empiricism). Thus, put forward in this way, the bad lot objection gives us very little in the way of reason to "not believe in IBE", leaving the question open whether or not it gives us reason to doubt those inferences to the best explanation that realists employ.

Second, IBE's critics might respond by suggesting that the above answer to the bad lot objection implicitly puts forward a retrenched version of IBE.[5] Typically, the "goodness" of the material content that one plugs into an inference form is fully determined by whether the particular premises used are true. However, I have argued above that the the goodness of IBE's material content is additionally a matter of whether the lot of hypotheses mentioned in IBE's second premise is good—i.e., whether the lot contains a true hypothesis. The critic might argue that this is tantamount to inserting a third premise into the form of IBE stating that the lot of hypotheses under consideration contains a true hypothesis. But in that case, the critic might fairly wonder, isn't this just another retrenched version of IBE? And furthermore, isn't it still the case that the bad lot objection provides a convincing rebuttal of IBE as traditionally conceived?

To answer this critic, it suffices to point out that if we insist on *not* adding the third premise in question, we will still need to assume that we are working with a good lot when evaluating IBE formally. This is because, whether or not one includes such a premise in IBE's formulation, the particular lot of hypotheses considered in any inference to the best explanation belongs to the material content, and not to the form, of that inference. Moreover, regardless of whether or not one includes the third premise, the quality of the lot of hypotheses considered in any instantiation of IBE has important bearing on the logical merits of the resulting inference. But then, in light of the general considerations put forward in Sect. 2.2, in order to evaluate the form of IBE accurately, we must *inter alia* assume that the lot in question contains a true hypothesis; to do otherwise would be to allow material defects to confound our formal evaluation. The upshot is that one must assume that the lot of hypotheses under consideration is not a bad lot in order fairly to evaluate the form of IBE, *regardless of whether the critic's third premise is inserted*. Thus, highlighting this condition on any fair formal evaluation of IBE is hardly tantamount to inserting the third premise.[6]

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[5] Thank you to an anonymous reviewer for helping me to see this potential response.

[6] It is questionable whether inserting the third premise in question would result in a retrenched version of IBE anyway. To retrench in this context would be to back-pedal and weaken IBE's form in some way. If a third premise stating that the considered lot contains a true hypothesis is inserted, then it admittedly *seems* as though we are retrenching by strengthening the premises needed to derive our conclusion. However, this is no retrenchment if the premise was always there, despite being suppressed. And there are potentially good reasons to believe that this might be the case. Put briefly, it seems doubtful that anyone would ever be inclined to infer the best explanation (i.e., to actually come to accept and believe the hypothesis that proffers the best of the available, potential explanations) unless he or she was already convinced that the true explanation was amongst the available options. But if this is the case, then the addition of this premise does not amount to adding a new premise to IBE as much as it amounts to clarifying a suppressed premise that goes assumed in any actual instantiation of IBE.

4 Conclusion

The bad lot objection has motivated decades of retrenchment. Accepting that IBE is defective in light of this objection, philosophers have proposed various reformulations of explanatory inference—either strengthening IBE's premises or weakening its conclusion. Effectively, with few exceptions, the result of this trend has actually been the abandonment of the study of IBE altogether. In IBE's place, philosophers today study related but distinct, weaker inference forms—e.g., inference to the conclusion that the best explanation is the most probable or most confirmed of the considered hypotheses.

If my response to the bad lot objection is correct, philosophers who defend explanatory inference have been too quick to retrench. On the one hand, the bad lot objection is powerless against the inference form of IBE (it is powerless against other inference forms too); but in that case, the objection provides no motivation for revamping the form of explanatory inference. On the other hand, the bad lot objection is more compelling when framed as a problem for particular inferences to the best explanation (e.g., those used by realists); but in this case, the bad lot objection is not an objection to IBE, but rather an objection to the material content involved in particular instances of IBE. In neither case does the bad lot objection call for us to discard IBE and replace it with a more modest formulation of explanatory inference.

For better or for worse, humans infer to the best explanation; they believe hypotheses outright based on the judgment that these proffer the best of the available, competing potential explanations. The question of whether this is for better or for worse is of the utmost philosophical importance; such a prominent mode of human reasoning should not, of course, go ignored in epistemology. For decades, many philosophers have by and large accepted that the human proclivity to infer best explanations is for the worse; and this because they believe the bad lot objection devastates IBE's formal cogency. This paper has attempted to defang this influential objection. Accordingly, I propose a renewed interest in the study of IBE, in all of its classically formulated, immodest glory.

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