Brown, Lipton, and the Prospects of High-level IBE

Brown's Project

With Brown's paper we turn to high level IBE. Brown is looking for the best explanation for the success of science, with an emphasis on the ontological consequences of that explanation. "Following the tradition," the success of science has three senses:

SS1: Many presently accepted theories are able to organize and unify a great variety of known phenomena.
SS2: This ability to systematize the empirical data is more extensive now than it was for previous theories
SS3: A statistically significant number of novel predictions pan out; that is, our theories get more predictions right than mere guessing would allow. (1136-1137)

SS1-3 are all about observables and serve as the explananda of the IBE. One thing to note is their different character. Laudan, in one of the recommended articles for this week, identifies a distinction, which will become important, between the sorts of success usually explained in high-level IBE. "When we ask why scientific theories work so well, we might be asking (and the realist response assumes as much) to be told what semantic features theories possess in virtue of which they have such an impressive range of true consequences. Alternatively, when we ask why science is successful, we might be asking an epistemic and methodological question about the selection procedures which scientists use for identifying those theories which are likely to be reliable"(92). SS1 and SS3 are the first sort of success, central to the debate between realists and anti-realists about whether the best explanation of the empirical success of our current theories is their truth or empirical adequacy. The issue is how the success follows logically from either explanation. SS2 belongs with Laudan's second characterization of success and highlights the historical success of science. It is not clear how the realism debate bears on the question of what historical process lead to our acceptance of theories that are successful. I hope this distinction and its importance will become more evident as we look further at both Brown and Lipton.

Brown considers three candidate explanations for these successes (empirical adequacy is conspicuously absent):

A) The success of science is a miracle, or we might say "mere chance." This is Popper's view. But Brown thinks it is not reasonable to "embrace miracles"(1136).
B) Scientific theories are true or at least approximately true. This is the realist view. Following Laudan's distinction, it seems to be relevant only for SS1 and SS3 Brown reconstructs the argument as follows:
   1. Conclusion O can be deduced from theory T.
   2. O is observed to be the case
   3. If T is true then the argument for O is *sound* and so O *had* to be true.
   4. If T is false then the argument for O is *merely valid* and the probability of the arbitrary consequence of O being true is very small.
   Therefore, the argument for O is probably sound.
   Therefore, T is probably true. (1138)
   The failure of Brown to consider empirical adequacy as a candidate explanation is shown to be a weakness of his account by analysis of this argument. In discussion Branden pointed out that Conclusion O can be deduced from the empirical substructure T* of T—the part that is about things like O that can be "observed to be the case." So this doesn't seem to be an argument for realism instead of constructive empiricism. T* is more probable (since it is logically weaker), and it has the same likelihood as T on O (namely, 1, since either both entail O or neither of them do. By not even considering empirical adequacy as an explanation, Brown starts off without a level playing field between the realist and anti-realist.[1]
C) Scientific theories are engaged in a Darwinian struggle for existence. The theories that make true observational predictions survive. This is Van Fraassen makes this argument in a chapter we've read. "I claim that the success of current scientific theories is no miracle. It is not even surprising to the scientific (Darwinist) mind. For any scientific theory is born into a life of fierce competition, a jungle red in tooth and claw. Only the successful theories survive—the ones which *in fact* latched on to actual regularities in nature"(1138). If this is meant to represent the constructive empiricist position, it seems like the realist and

[1] Brown offers no argument for not considering empirical adequacy as a candidate explanation. Perhaps, following some of Lipton's intuitions, he takes SS1 to just be empirical adequacy. But if we want to adjudicate between the realist and the constructive empiricist, we have to take the explanandum to be something explicable by the constructive realist, like the empirical success of science.

> empiricist will just be talking past each other. Van Fraassen intended this argument as an explanation that for SS2 that doesn't require us to use miracles to explain the historical success of science. The candidate explanation that the empiricist offers for SS1 and SS3 is empirical adequacy. Brown does not identify empirical adequacy as a candidate explanation. But if the empiricist is offering a candidate explanation for SS2 and the realist for SS1 and SS3 there is no engagement between them. In fairness to Brown, he considers Darwinian and truth explanation as attempts to explain SS1-3. But is this a fair representation of the realist and constructive empiricist positions?

Brown is a realist and endorses a unique version of the truth explanation.

Darwinian Explanation
First, Brown considers the Darwinian explanation. He argues that it fails to explain SS1, SS2, or SS3 so it "accounts for nothing"(1139).

On SS3 (novel prediction): Consider the Darwinian analogy. "Most species could not survive a radical change of environment"(1139). If a theory survives because it makes true observational predictions with one set of experiments/data, why should we expect it to work in others? The Darwinian explanation might fail with respect to SS3, but then it was only intended to explain SS2. The realist will appeal to the truth our theories to explain novel prediction and the constructive empiricist to their empirical adequacy (which will be at least as explanatory).

On SS1 and SS2: Brown admits that it seems that the Darwinian explanation accounts for these: SS1 because the theories that organize and unify a great deal of known phenomena are selected and SS2 because theories from the past that don't do it as well are replaced.[2] But, Brown argues that an implicit assumption of empiricism is that "rational choice and success go hand in hand." But in reality, success is not a totally empirical notion. Other concerns (conceptual, metaphysical, aesthetic) play a role in theory choice. "Anyone who is not an extreme empiricist must concede that it is quite *possible* that the most rationally acceptable theory is not the most successful theory"(1139).

As far as SS2, I wonder if a more sophisticated empiricism could not be formulated (it would, in fact, be surprising if Van Fraassen ignored pragmatic concerns). Sure, aesthetic concerns matter to theory selection, but empirical success will be an important (the most important?) factor in theory selection. A beautiful theory will not survive if it is not able to organize and unify a great deal of observable phenomena—if it, for example, often makes incorrect predictions. Simply because it is not the only factor that scientists evaluate theories on, does not mean that its role as a factor does not explain why science is able to organize and unify a great deal of known phenomena. All Van Fraassen needs is an explanation good enough not to require belief in miracles. Anyhow, this explanation isn't an area of debate between the realist and the constructive empiricist (no reasonable theory of choice would say that scientists always choose *true* theories). They will probably both be unsatisfied with a Darwinian explanation for SS1, both wanting to employ logical not historical explanations (reasons logical explanations might be preferable to historical for this sense of the success of science will become apparent when we look at Lipton's treatment of the selection explanation).

But if we agree with Brown's analysis of the failure of Darwinian explanation to account for SS1, SS2, and SS3 we follow him in conceding "it accounts for nothing at all." We are down to two candidate explanations for the success of science: the truth explanation and miracles. "The realist is without a plausible rival"(1147). But is this because Brown has ignored truth's plausible rival, empirical adequacy?

Truth Explanation
Brown considers whether an anti-realist (Laudan) can argue against the truth explanation by skepticism of induction. (1145) Why should the anti-realist accept the following inference, which commits the fallacy of affirming the consequent?

1) If Theory, then Observation
   Observation
   Therefore, (probably) Theory

[2] The reason why Darwinian explanation is actually a better explanation for SS2 than SS1 is brought out by Lipton's red-haired league example.

But Brown points out that Van Fraassen also relies on induction.

2) If T is empirically adequate, then Observation O
Observation O
Therefore, (Probably) T is empirically adequate

Van Fraassen's point, if I understand it in this context, was one is not rationally obligated to accept 1 for unobservables because she accepts 2 for unobservables. One could be a skeptic of induction, but thereby gives up the principled arguments for realism and anti-realism. So inductive skepticism isn't a serious objection to the truth explanation.

One intuitive way to defend the truth explanation is with appeal to the idea that the succession of theories is getting closer to the truth. Brown considers a couple of views that try to flesh out the idea of approximate truth: the constancy of reference and verisimilitude. I won't get into the details here (this is week 16 stuff) other than to say Brown rejects them. "Unfortunately there are terrible problems with both of these. Beliefs about the constancy of reference run afoul of the history of science, and the concept of verisimilitude is plagued with technical problems. Even a cursory glance at the past suggests that there is no royal road to the truth such as that implied by the convergent picture, and every explication of verisimilitude so far has been a crashing failure" (1140).

Brown considers what sense of the success of science truth can explain.
Probably not SS2 (scientific progress) because that needs a theory of verisimilitude. Probably not SS3 (novel prediction) because many theories thought to be false made true novel predictions: for example Ptolemaic astronomy predicted eclipses regularly.

SS1 may give the best hope, even though truth is neither a necessary nor sufficient condition for SS1
Not necessary: "the historical record is full of theories that were successful [in the sense of SS1] but false"
Not sufficient: "theories which were unsuccessful but (by our present lights) true" (1148) [What sort of theories does Brown have in mind here? Maybe theories which were unsuccessful because of experimental mistakes or other epistemic problems—would that even make the theories unsuccessful or only apparently?]
Because truth is not sufficient, or nearly sufficient, for SS1 DN or IS models of explanation won't work.

Brown offers a new style of explanation that doesn't require necessary or sufficient conditions. He first appeals to Salmon's idea of statistical relevance: A is statistically relevant to B if and only if Pr (B/A) != Pr (B). Truth is statistically relevant to the success of science, on Brown's account. "Truth matters to the outcome, though it only matters a little"(1149). I think the idea would be that the relevance looks something like Pr(SS1/truth) > Pr(SS1/not truth).

Then he appeals to narrative style of explanation used in biology and history. He uses the example of an evolutionist who conjectures that giraffes have long necks because they were able to eat tall plants when food was scarce. The giraffes with long necks would have survived in such an environment. It isn't an exact account of what actually happened, but "one of the many courses that nature might have taken" (1149).

Here, then is the suggestion:
"The realist has an explanation for the success of science. Truth is the explanation and the style of explanation is narrative. The truth is not known to obtain, it is hypothetical. But even if it did obtain, success would not automatically follow. The presence of truth does make a difference, however; truth is statistically relevant"(1150).

Scientists do not know that their theories are true. But if they are, that truth would explain the success of science. Brown has presented a style of explanation in which explanations are not linked to justification but possibility. It is not, Brown admits, a definitive argument for realism but lets us see how science could be successful. Explaining the possibility of the success of science is enough to deny that it's a miracle.

But again, why couldn't an anti-realist appeal to empirical adequacy rather than truth in these sorts of explanations? Empirical adequacy does just as well here as far as the statistical relevance is concerned. From Van Fraassen we get Pr(SS1/empirical adequacy & truth) = Pr(SS1/empirical adequacy). Brown seems to recognize this. "Saying that a

theory is true does not lead to any testable predictions over and above those already made by saying the theory is empirically adequate. There is no additional predictive power to this sort of narrative explanation. But even though predictive power is lost, this does not lead to the demise of the claim of explanatory power"(1150). So what's going on? What is the extra explanatory power?

In discussion, Branden (Lipton, I think, would agree) seemed to think Brown must be making a mistake that realists typically do in high-level IBE arguments of slipping back to low-level IBE and not keeping the relations logical.[3] It seems like he thinks truth explains the physical phenomena better than empirical adequacy, presumably because it is somehow a better causal explanation (with caveats from last week and Hitchcock's dilemma). But at the high-level we're trying to explain the success of science, and this follows logically from the truth of scientific theories just as surely as from their empirical adequacy. In fact the success of science follows from truth because truth entails empirical adequacy. I'll let Branden say more about what's going on here.

From Seminar Discussion: Though Brown is a realist, perhaps his account is not meant to be an argument for realism or anti-realism. Toward the end of the article, he writes "the explanatory power that truth does have is not the sort to make us believe in realism"(1150). Acceptance of this style of explanation can give one warrant not to believe in miracles and empirical adequacy can also play this role. Brown is not arguing for an inference to realism or anti-realism. He writes "We have shown how, given realism, the success of science is possible, why its not a miracle. But that style of explanation does not let us infer its correctness"(1151). He, however, says very little about any anti-realist alternative besides the Darwinian argument.

Final Thoughts on Brown

The power of truth on Brown's account, he admits, ends up being pretty vacuous. But it's the best explanation in a weak field. One might try to make other explanations stronger: (if I'm right) the Darwinian explanation by giving a sophisticated empiricist response to Brown's concerns (we may still be stuck with a novel prediction (SS3) problem); the truth explanation by coming up with an acceptable account of verisimilitude.

Are we really stuck with either this weak truth explanation or embracing miracles (which, really, aren't explanations at all)? According to Lipton's account of IBE, we can withhold judgment. So it might be defensible not to endorse any explanation, but still think one worth endorsing might come along. In the meantime, IBE won't settle the realist/anti-realist debate.

Lipton's Project

Lipton is also looking for the best explanation of the success of science. He reminds us of three features of his account of IBE (which all become very important)

1) Needs to be loveliest, not just likeliest
2) The same evidence might warrant two different but compatible explanations
3) There are many cases in which no explanation warrants inference

For Lipton, the success of science is understood as

SS: The predictive success of scientific theories (92)

Lipton considers four candidate explanations for these successes:

A) Truth explanation: Like Brown's, the statements of a theory are true or approximately true.
B) Empiricist explanation: empirical adequacy, that all the observable consequences of a theory are true
C) Selection explanation: Like Brown's Darwinian explanation, "the best explanation of the predictive success of a theory is that the theory was selected for precisely that reason."
D) Existential adequacy explanation: "We have good reason to believe in the existence of entities cited by scientific theories, even in cases where those entities are unobservable."

[3] Lipton has a nice analogy to motivate why this relation must be logical. "The truth of a theory entails the truth of the entailed consequences, but it does not cause it. Thus while the theory of plate tectonics gives causal explanations of various observed features of the continents, the truth of a theory does not cause the truth of the observations, any more than the correctness of a map of the London Underground causes the stations to fall in the order I observe during my journey"(93). More on this later.

For IBE to work for the truth explanation, Lipton points out one must accept both

(i) the cogency of IBE
(ii) that the truth explanation is the best explanation

In an argument that I'll just gloss over, Lipton argues for (i) by analogy with induction. Brown justified it by saying that everyone does it. Lipton argues that even if we can not justify induction to the skeptic (with an inductive argument), induction may "confer reliability and knowledge on those who follow it. For it may be that induction will in fact be reliable and, if it wasn't going to be reliable, we already would have noticed this in virtue of a breakdown in our inductive practices"(95). Similarly, most scientists are already committed to the reliability of IBE so "as an argument of the form to which [they are] already committed and which can, unlike viciously circular arguments, yield true knowledge and justification if that form of inference is objectively reliable"(98).[4]

If we accept that argument we can move to (ii), the issue we've already looked at in Brown. Lipton argues that none of our four candidate explanations is a good explanation.

Empiricist Explanation:
The first thing Lipton notes about the empirical explanation is that it is compatible with the truth explanation. All true theories will be empirically adequate. Could the empiricist argue that his is still better? "The empiricist could manufacture incompatibility by modifying his explanation to say that the theory is adequate and *not* true, but this hardly seems to improve the quality of the empiricist explanation. Indeed it seems to worsen it, by adding an explanatory idle component (the falsity of the theory)"(98). The empiricist, I think, could respond to this argument. He could deny that part of his explanation is that the theory is false. He is agnostic on the issue and it isn't part of his explanation at all. This makes his explanation more probable (remembering Van Fraassen).

Another problem Lipton sees with the empiricist explanation was alluded to in the discussion of Brown: that there isn't much difference between the success of science and its empirical adequacy. Beyond this, there's the matter of loveliness. "How does the correctness of unchecked predictions help to explain the correctness of those that have actually been checked? The realist's truth explanation looks profound by comparison"(99). Granted, Lipton's question makes the empiricist explanation seem a little unlovely. But is the truth explanation really more lovely than the empiricist explanation? It's on no better footing on logical grounds and this what is relevant to the evaluation of high-level IBE explanations. Remember, the part of theories that go beyond their empirical substructures is irrelevant to their predictive success. So we might ask Lipton, what is so profound about explaining the predictive success of science with something irrelevant to that success?

Later, however, Lipton offers an objection to the truth explanation that also works against the empiricist explanation. This is what would should expect at the high-level: either empirical adequacy is explanatory or neither empirical adequacy nor truth are.

Selection Explanation
Remember that Van Fraassen offered the selection argument as a historical account of the success of science. In his response to Putnam he writes, "Let us also resist construing it as merely a restatement of Smart's 'cosmic coincidence' argument, and view it instead as the question why we have scientific theories at all…. I would like to point out that science is a biological phenomenon, an activity by one kind of organism which facilitates its interaction with the environment. And this makes me think that a very different kind of scientific explanation is required.

The selection explanation is thus, as Lipton points out, compatible with the truth explanation. Further, the selection argument doesn't explain everything that the truth argument does. This is because while selection arguments can explain why members of a group have a certain feature, they can't explain why any single member of the group does. This is the "de re"/"de dicto" worry that Matthew brought up last week. Lipton uses the example of a meeting of "the red-haired league." Their being in the league explains why everyone at the meeting of the league has red hair, but doesn't explain why any individual at the meeting does (for instance whether it's a matter of phenotype or

[4] A point from Branden via last week's discussion: Even if IBE generates reasons to believe in unobservables, does it provide conclusive reasons? Does it yield obligations to believe? If not, then this is no reply to Van Fraassen's challenge.

dye). "Similarly, while the selection story explains why the theories we now accept have been successful, it does not explain why a particular theory so selected is successful. A particular theory is not successful because it was selected; quite the reverse. By contrast, the truth of that theory would explain its success"(100).

With the selection explanation, though, Van Fraassen only endeavored to offer a type level explanation of the success of science. The truth explanation doesn't address this historical concern. His token level explanation is the empiricist explanation. The selection argument shouldn't really be seen as a rival to the truth explanation.

Lipton levels another attack against the selection argument (which again seems a little beside the point) later in the paper: that the selection explanation provides no argument for our theories being empirically adequate. He motivates this attack with an example: "We are given the past predictions of an astrologer, call him 'Clarence,' and are struck by their number and accuracy. Perhaps there is something to astrology after all! Later, however, we discover that Clarence was selected on the basis of his success from among hundreds of astrologers, all the rest of whom made predictions about the same string of events but were wrong. Once we realise that Clarence's success are only the tip of a disappointing iceberg, our confidence in his next prognostication tumbles"(105). But the empirical adequacy of scientific theories will prevent this tumble as surely as their truth will.

A further point about the selection explanation: Branden thinks there may be problems with taking the evolution analogy too literally (a theory is really a type of token models and evolution takes place on models, not theories). If we have time, he can explain these.

Truth explanation

Lipton argues that statement realism can't explain the success of theories due to the problem of underdetermination. There are infinitely many theories which are incompatible with each other based on truth conditions alone, but which have the same predictive success. The realist cannot choose between these explanations and thus cannot infer to the best explanation.

As we saw in Branden's diagnosis of Brown, the realist cannot somehow choose between these competing explanations on grounds other than predictive success. The reason she cannot, Lipton identifies is that the truth explanation is a logical rather than a causal relation. "The truth of a theory entails the truth of its observed logical consequences, but it does not cause it"(93). Truth itself fails to distinguish between the explanatory power of different theories. Granting that all scientific theories are true leads to contradictions. "The truth of a theory is no better an explanation of its predictive successes than would be the truth of any other incompatible theory that would enjoy the same successes"(102).[5]

Branden's suggestion from seminar: This underdetermination problem (if we part with Lipton and apply it to compatible theories) can keep us to choosing whether to infer to the truth explanation or the empiricist explanation (regardless of the underdetermination problem among theories taken to be true or those taken to be empirically adequate). If T1 and T2 would enjoy exactly the same predictive successes (if true), then neither can better explain predictive success. This entails that the truth explanation is no better an explanation than the empiricist explanation of the success of the truth explanation. This makes Lipton's earlier point against the empiricist explanation look puzzling.

Existential adequacy explanation

Existential adequacy is related to the truth explanation. It says that the only truth statements that matter in a theory are those about the existence of entities. Terms of a false theory may refer, in which case the theory is existentially adequate. It, like constructive empiricism, is a more modest position than statement realism because it is entailed by statement realism.

But entity realism falls to the same underdetermination problem that befell the truth explanation. The problem isn't as bad because theories that share the same predictive success and existential commitments will be consistent. But "there are also many theories with different ontologies which that would be just as successful. Insofar as the

[5] Note that this objection also works against the constructive empiricist as well as the realist, since the empiricist has the same underdetermination problem with respect to observables.

existence of electrons explains the success of our electronic theory, the existence of 'shmelectrons' would explain the ability of the schmelectron theory to entail exactly the same predictive success"(106).

Lipton's Conclusion

All of the candidate explanations examined by Lipton failed to explain the success of science. Such a strategy, he concludes, isn't the right way to defend scientific realism. Lipton himself prefers a kind of statement realism. He doesn't argue for it here but makes a number of suggestive comments. He doesn't approve of the modesty claimed by the constructive empiricist and entity realist. In what looks like it might be an attempt to goad those who think they are not rationally obliged to believe the claims about unobservables in scientific theories to come down on one side or the other on the issue he writes "We should not have a Cartesian obsession with error. Error is an epistemic flaw, but so is ignorance. A sensible epistemic policy must balance security and scope, so modesty is not always an epistemic virtue"(108).[6]

He claims that statement realism can claim a modesty of its own with appeal to approximate truth or verisimilitude (those notions of truth explanations that Brown found problematic, come back Week 16 for more). He believes that scientific explanation ought to focus on causal rather than logical relations. Such explanation cannot explain the high-level IBE of the success of science. But no sort of explanation we have now can inspire that inference.

[6] In seminar discussion from Paul Teller: There are conflicting epistemic values between (risk/interesting truth) and (caution/saying less). Lipton thinks these values are objectively set. Van Fraassen thinks that the choice of epistemic values is a subjective, pragmatic matter.