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ORIGINAL RESEARCH

How Simplicity Can be a Virtue in Philosophical Theory-Choice

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Abstract
Sober and Huemer have independently argued that simplicity has no place in evaluating philosophical views. In particular, they have argued that the best rationales for scientists to appeal to simplicity in judging between rival theories fail to carry over to philosophers judging between rival philosophical accounts. This paper disagrees with Sober and Huemer. It argues that two rationales for scientific appeals to simplicity equally well underwrite appeals to simplicity when philosophers evaluate rival rational reconstructions of some social normative practice. These two rationales are shown to apply to two philosophical appeals to simplicity: in Quine's argument against analyticity and in an argument against pluralism in accounts of scientific explanation. Some factors are identified that influence how much weight simplicity should carry in these and other philosophical cases. Simplicity's legitimate role in evaluating rival rational reconstructions suggests that simplicity will also turn out to be justly relevant to ontological investigations.

Keywords Analyticity · Bayesian confirmation theory · Explanation · Ontology · Quine · Simplicity · Sober

1 I

The basis of philosophical methodology has lately received increased scrutiny (e.g., Chalmers et al., 2009, Williamson 2007). This paper concerns such a meta-philosophical issue: What role should simplicity (otherwise known as "parsimony" or "Ockham's Razor") play in philosophical reasoning, and why are we entitled to use simplicity in that role?

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Recently, Huemer (2009) and Sober (2015:244–290) have examined whether the most promising grounds for appealing to simplicity in scientific theory-choice also apply to philosophical theory-choice. Both arrive at negative conclusions. Huemer (2009:216) concludes that "none of the accounts of the virtue of parsimony" in science "extends naturally" to certain philosophical uses, and that "this suggests that in typical philosophical contexts, ontological simplicity has no evidential value." Sober (2015:246) is more cautious, but he identifies many "parsimony arguments in philosophy that do not measure up to the justified applications of parsimony that are found in science" (and relatively few that do). He recognizes that the defender of these parsimony arguments in philosophy "has the option of suggesting that parsimony should play a role in philosophy that is undreamt of in science" or the option of arguing that there are some successful scientific parsimony arguments that work for reasons besides those that Sober has identified. Without passing official judgment on these gambits, he writes engagingly: "I confess that I often raise an eyebrow at philosophical parsimony arguments that float free from the scientific parsimony arguments whose justifications I can understand."

The philosophical appeals to simplicity examined by Sober and Huemer are made:

- In defending physicalism over dualism in the philosophy of mind (Sober and Huemer).
- In defending nominalism over realism regarding universals (Huemer) and over platonism regarding mathematical abstracta (Sober).
- In defending atheism over theism, considering the problem of evil (Sober).
- In defending moral anti-realism over moral realism (Sober), and
- In defending realism about the external world over solipsism (Sober).

Huemer (2009:227–28) characterizes the two examples he examines as "representative philosophical appeals to parsimony".

All of these appeals to simplicity are importantly alike: they are all made in the course of theorizing about what there is – in a broad sense that goes beyond investigating what particular entities occupy spacetime. (The same applies to the examples of metaphysical appeals to simplicity discussed by Bradley 2018 and the papers cited therein.) But not all of philosophy aims to ascertain what there is, even in some very broad sense. Roughly speaking, some philosophy aims to interpret ongoing social practices by making explicit the well-founded norms governing them. In the old days, this interpretive aim was variously termed "logical analysis", "explication", or "rational reconstruction". Perhaps the aim is to give a kind of philosophical explanation. Whatever this activity amounts to precisely, it is unquestionably something that philosophers often do (e.g., epistemologists propose analyses of knowledge). But it does not consist of doing ontology -- of investigating what there is, even in a broad sense. An explication does not aim to describe past episodes of the given practice. Rather, an explication is normative: it aims to explain what made certain past episodes correct and to identify how it would be correct for the practice to continue.[1]

[1] That a "logical analysis" does not aim to describe how a practice actually works, but to set a standard of how it ought to work (i.e., a standard by which future cases can be judged), is emphasized by Hempel

Simplicity has often been cited as playing a role in the evaluation of proposed rational reconstructions. Philosophers engaging in rational reconstructions often cite Carnap's (1962:5–7) account of how we ought to judge whether a proposed rational reconstruction of some concept is correct, namely, by appealing to.

(i) the proposal's fidelity to the past practice of deploying the given concept (though the proposal will likely not agree with every past instance where the concept was used),
(ii) the proposal's logical character (including its consistency and clarity),
(iii) its fruitfulness (in being able to play important roles that the concept performs and in illuminating the given practice), and
(iv) its simplicity.[2]

There is obviously some evidence from philosophical practice for including simplicity among the desiderata for successful explications. For instance, in explicating what knowledge amounts to in light of Gettier cases, philosophers generally seek a single additional condition to cover all Gettier cases rather than separate, ad hoc conditions each of which covers one or another Gettier case. As another example, when Enoch and Spectre (2021:5689) evaluate rival rational reconstructions of various episodes of moral and legal reasoning, they are guided by "the following plausible, rather minimal methodological principle: if two theories are equally good in other respects, and one of them offers a unified account of what seem like unified phenomena and the other doesn't, this is an advantage of the former."

Carnap apparently takes any proposed rational reconstruction's simplicity as counting (at least to some degree) in its favor (although its simplicity may be outweighed by other considerations). I will not endorse this view, just as I see no reason to suppose that any scientific theory's simplicity contributes to its plausibility; sometimes a scientific theory's simplicity may even count against it.[3]

(1945:117 – 18), who cites simplicity as among the considerations that should influence a decision among rival proposed rational reconstructions. It is not necessary here to explicate explication; for some distinctions among various projects of explication, see Wagner 2012.

[2] Carnap (1962:7) emphasizes that simplicity has "secondary" importance compared to the other three criteria. Note that Carnap regards the optimal satisfaction of these four criteria as *constituting what it is* for a rational reconstruction to be best. He does not regard rational reconstructions as aiming for truth. Rather, he sees them as aiming to reveal which conventions are more useful for us to adopt for certain purposes. Carnap's view of what makes an explication correct is bound up with his distinction between internal and external questions (Carnap 1950). Hence, for Carnap, the question of what justifies our appealing to simplicity in judging among proposed rational reconstructions is a trivial question. Simplicity is not *evidence* for a rational reconstruction's correctness; it is part of what *makes* a rational reconstruction correct. However, Carnap's conception of what makes a rational reconstruction correct is not typically endorsed by philosophers in citing Carnap's criteria as specifying the basis for judging among rival proposed explications, and I do not endorse it. So there remains a need to understand the rationale for philosophical appeals to simplicity in evaluations of rival rational reconstructions.

[3] As Salmon (2001:81) emphasizes, "in anthropology and sociology…an extremely simple hypothesis may be deemed *implausible* because it is likely to be an oversimplification." We may have good inductive evidence in social-science cases that the explanation is likely to be multifactorial. This fits nicely with the rationale for appealing to simplicity in philosophical theory-choice that I give in section IV. For a broader context in which to place this view, see Lange 2022.

I also disagree with Huemer and Sober. I believe that they have been misled by considering only a narrow range of philosophical appeals to simplicity. They consider only examples where philosophers appeal to simplicity in support of ontological theories. They fail to consider examples where philosophers appeal to simplicity in evaluating the plausibility of rival rational reconstructions. The purpose of this paper is to argue (contrary to Huemer and Sober) that the most promising justifications for appealing to simplicity in some cases of scientific theory-choice do carry over to some cases of philosophical theory-choice – at least (though perhaps not only) to some cases where the aim of philosophical theorizing is to give rational reconstructions.

In Sect. 2, I will give two examples where philosophers have given rival rational reconstructions differing in simplicity. I will suggest that in one of these disputes, simplicity carries greater weight (in favoring one of the rival rational reconstructions) than it carries in the other dispute. In Sect. 3, I will argue that one of the grounds that Sober and Huemer deem most promising for underwriting simplicity's role in scientific theory-choice carries over to these two philosophical examples. But I will also raise a doubt about this proposed ground of appealing to simplicity. (This doubt will apply equally to its grounding *scientific* appeals to simplicity as to its grounding *philosophical* appeals.) In Sect. 4, I will argue that another rationale for simplicity's role in scientific theory-choice also carries over to these two philosophical examples. I will argue that both of these rationales identify certain factors as giving simplicity greater weight in certain philosophical examples than in others. Although I do not insist on my particular estimate of simplicity's relative weight in my two philosophical examples, I do contend that an agent's opinion regarding how these examples compare in the factors that I have identified should align with her opinion on simplicity's relative weight in the two examples.

I will conclude in Sect. 5 by pointing out that some philosophical work (e.g., the study of natural lawhood and objective chance) involves both rational reconstruction and ontological investigation. If simplicity carries weight in deciding among rival rational reconstructions but generally not in deciding among rival ontological theories (as Sober and Huemer suggest), then the result will be unfortunate: our best rational reconstructions will turn out to be difficult to reconcile with our best ontological theories. In other words, our best ontological theories will deem some of our practices to be ill-founded and to require alteration. Those who find this result implausible will thus have some reason to expect that upon closer examination, simplicity will turn out to be generally relevant to ontological investigation just as it is to rational reconstruction.

2 II

I will now introduce two examples where simplicity might count in favor of one proposed explication over another. Of course, each of these examples involves its own important philosophical issues that I can address only slightly and insofar as they bear on the role played by simplicity. (Huemer and Sober are likewise constrained in their brief discussions of philosophical examples.)

Let's start with Quine's famous argument against the analytic/synthetic distinction in "Two Dogmas of Empiricism" (Quine 1980). It has been given myriad interpretations. It has been interpreted (Gutting 2009:13) as no cogent argument at all. It has been interpreted (Gutting 2009:21–22) as the argument that analyticity cannot be defined in the purely behavioristic terms of the field linguist – which is surely too narrow a standard of intelligibility. It has been interpreted (Soames 2003:360–1) as the argument that analyticity cannot be defined non-circularly and without using a notion (such as meaning, synonymy, logical consequence, or necessity) that "stands in exactly the same need of clarification as does the notion of analyticity itself" (Quine 1980:20) – a standard that would presumably also doom such notions as set-membership and being humorous. I prefer to interpret Quine's argument more charitably.

Quine's discussion of the analytic/synthetic distinction takes place against a traditional view of the epistemic role played by beliefs regarding basic analytic truths. That role involves not merely being believed justly (i.e., appropriately, reasonably) and very confidently, but also being a belief any tokening of which, no matter by whom or in what circumstances (e.g., regardless of the lighting conditions), can properly end a regress of demands for epistemic justification ("What is your reason for believing that?"…"What is your reason for believing THAT?"…).[4] Such beliefs are maximally resistant (but not entirely immune) to being revised in response to observation. That the beliefs playing this epistemic role concern basic analytic truths is supposed to explain why these beliefs are able to play this role.

Quine points out, however, that some claims traditionally regarded as synthetic truths can also play this epistemic role. In "Epistemology Naturalized" (1969:86), Quine gives "There have been black dogs" as an example; Wittgenstein (1972:46, Sect. 165) gives "The earth is already hundreds of years old." According to Carnap (Quine's principal opponent in "Two Dogmas"), beliefs about basic analytic truths and beliefs about these core synthetic truths acquire their power to play this epistemic role by entirely different means: the former by convention when we decide (on pragmatic grounds) to adopt some linguistic framework, the latter by empirical evidence confirming the claim within the adopted framework.

By contrast, Quine proposes that the same, broadly empiricist means of acquiring the power to end regresses of epistemic justification operates in both cases. Roughly speaking, both kinds of belief acquire the capacity to play this role by virtue of lying near the center of the "web of belief". No such belief is subject to empirical test in relative isolation. Nevertheless, any such belief is crucial to the entire corpus of belief hanging together and being testable against empirical evidence.

Thus, whereas Carnap's account proposes that there are two, entirely separate "mechanisms" for generating the power to play this epistemic role, Quine's account proposes that a single "mechanism" operates in all of these cases. In this respect, Quine offers a simpler explanation of how these two, traditionally distinct kinds of belief come to share the power to play this particular epistemic role. This philosophi-

[4] This epistemic role is what Sellars (1963:164–66, Sect. 32), rehearsing the traditional view, calls possessing "intrinsic type credibility." By contrast, whether a putative observation report can end a regress of epistemic justification depends on whether it was asserted by a qualified observer in standard conditions. It possesses what Sellars terms "token credibility."

cal appeal to simplicity is my first example where simplicity might count in favor of one proposed explication over another.[5]

Of course, by a "mechanism" generating the power to end regresses of epistemic justification, I do not mean a *causal* mechanism. The power to end regresses of justification is a *normative* matter; it concerns the way that holding some belief (under the proper circumstances) renders one *entitled* to hold various other beliefs, not the way that holding some belief *causes* one to hold various other beliefs. The belief's regress-stopping power is not its power to *cause* anything (such as the power to cause your interlocutor to stop asking you "Why do you believe *that*?"); rather, its regress-stopping power is its power to justify inferentially without, in turn, requiring an inferential justification. By a "mechanism" for generating the power to play this particular epistemic role, I mean a philosophical explanation of how this regress-stopping power arises. I am using the term "mechanism" here to make it easier to compare Quine's appeal to simplicity with cases where scientific explanations positing a single causal mechanism are favored, on the grounds of simplicity, over scientific explanations positing many separate causal mechanisms to account for the same phenomenon.

Now for my second example of a philosophical appeal to simplicity. The philosophical literature is replete with proposed varieties of scientific explanation. Philosophers have proposed that there are

- asymptotic explanations (Batterman 2002),
- causal-mechanical explanations (Salmon 1984),
- covering law explanations (Hempel 1965),
- dimensional explanations (Lange 2009),
- geometrical explanation (Nerlich 1979),
- mathematical explanations (Baker 2005, Pincock 2007),
- mechanism-based explanations (Machamer et al. 2000),
- model-based explanations (Bokulich 2011),
- "really statistical" explanations (Lange 2013),
- structural explanation (Hughes 1989, Clifton 1998), and
- unificationist explanations (Friedman 1974, Kitcher 1989),

[5] On this reading (which I owe to Brandom (2015:7, 21) who, in turn, credits Rorty), the point of Quine's famous argument that every definition of analyticity is ultimately circular is to show that analyticity makes contact with nothing outside of a small family of other notions (e.g., meaning, synonymy, logical equivalence). Therefore, besides the alleged facts expressed in terms of these other notions, there are no other phenomena that we need to use the analytic/synthetic distinction in order to explain. In other words, the point is to show that if we reject the analytic/synthetic distinction, then we can also safely reject these other putative differences between the two kinds of belief (in terms of their relations to meaning, synonymy, logical equivalence, and so forth) without undermining our explanations of other phenomena. As Rorty (1979:174) says, "Quine thinks that 'meanings' drop out as wheels that are not part of the mechanism." (This is the same use of "mechanism" as mine.) Of course, my argument in this paper does not presuppose that Quine is correct in rejecting analyticity and proposing an empiricist account of the justification of our beliefs regarding truths traditionally termed analytic. My argument presupposes only that there is an argument appealing to simplicity that counts in favor of Quine's account (which is compatible with the existence of other, stronger arguments against it).

among other kinds. Although some of these proposals compete as rival explications of certain scientific explanations, these proposals are not generally mutually exclusive. Hence, there are two possible shapes that a comprehensive account of scientific explanation might take.

One option is that several or, indeed, all of the above proposals correctly identify distinct varieties of scientific explanation. There could be some family resemblances among some of them, accounting for why they are all called "explanations", but there would nevertheless be an irreducible plurality of ways ("mechanisms") by which scientific explanatory power is generated. This appears to be Salmon's late view; he suggested that top-down unificationist and bottom-up causal-mechanical explanations constitute "two concepts of scientific explanation … both of which are perfectly legitimate" (1989:185). Salmon (2006:xv) called them "complementary".

The second option is that there is fundamentally only a single kind of scientific explanation – a single means by which all scientific explanations derive their explanatory power. Kitcher portrays his unificationist account of explanation as aiming to reveal the common source of explanatory power for all varieties of scientific explanation, and he sees Hempel's rival covering-law approach as also having this aim:

> The search for understanding is, on many accounts of science, a fundamental goal of the enterprise. That quest may take different forms in different historical and disciplinary contexts, but it is tempting to think that there is something that underlies the various local endeavors, something that makes each of them properly be seen as striving after the same goal. The Hempelian conception proposes that there is an abstract conception of human understanding, that it is important to the development of science, and that it is common to the variety of ways in which understanding is sought and gained. (Kitcher 1989:419)

Kitcher sees the prospect of such a unitary account of all scientific explanation as "an obvious motivation for pursuing the Hempelian conception" and, by implication, his own. Likewise, Woodward (2003:221) suggests that "the common element in many forms of explanation, both causal and noncausal, is that they must answer what-if-things-had-been-different questions," where causal explanations specify what would have happened under an intervention and noncausal explanations trace counterfactual-dependence relations not concerning interventions. (Bokulich (2011: 38–9), among others, has pursued Woodward's suggestion.) Likewise, Strevens (2008:5) proposes "tentatively" that "every kind of explanation" works by identifying "those aspects that *make a difference* to whether or not the phenomenon occurs", with a different "dependence relation" in different domains. As Kitcher suggests, any such proposal might seem to derive some added plausibility by virtue of its simplicity in positing ultimately only a single means of acquiring explanatory power rather than a heterogeneous collection of distinct models of scientific explanation.[6]

[6] I have confined my attention to accounts of *scientific* explanation, but similar remarks could be made concerning accounts that aim to cover explanation taken more broadly to include legal explanation, moral explanation, aesthetic explanation, philosophical explanation, and perhaps even explaining a story or how to do long division. Note that in his later work, Kitcher (2016:147) explicitly rejects his earlier view that there is a single general account of scientific explanation.

Here, then, are my two examples of appeals to simplicity in the choice between rival rational reconstructions. It seems to me that intuitively, simplicity weighs more heavily in favor of Quine's account than in favor of a unitary model of all scientific explanations. But I will not insist upon this estimate of simplicity's relative weight; my point is merely that simplicity may weigh differently in different cases. Our task now is to see whether promising approaches for capturing simplicity's epistemic relevance in scientific theory-choice carry over to the choice between rival rational reconstructions in my two examples -- and whether these frameworks identify reasons for simplicity to carry greater weight in certain philosophical examples than in others.

3 III

Huemer and Sober say that the most promising frameworks for capturing simplicity's epistemic relevance for *scientific* theory-choice do not deem simplicity to be epistemically relevant for *philosophical* theory-choice. I disagree. Let's look at a framework that Huemer and Sober endorse as highly promising for capturing simplicity's epistemic relevance for scientific theory-choice. I will argue that it applies to the choice among rival rational reconstructions as well.

When we update our degrees of confidence in hypotheses *h* and *k* in response to our total new evidence *e*, then according to Bayesian confirmation theory, the ratio of our updated degrees of confidence in *h* and *k* should equal the ratio of our prior degrees of confidence in *h* and *k* multiplied by the ratio of the "likelihoods" of *h* and *k*. That is:

$$pr'(h)/pr'(k) = [pr(h)/pr(k)]\,[pr(e|h)/pr(e|k)]$$

(where the primed probabilities are our updated degrees of confidence and the unprimed probabilities are our prior degrees of confidence). Huemer (2009:221) regards this apparatus as supplying "the most promising account" for construing "simpler theories as tending to be *better supported* by the data which they fit than are more complex theories which fit the data equally well." Sober (2015:147) likewise endorses the "likelihood framework" as capturing the epistemic relevance of simplicity in some scientific cases. On this framework, *h*'s having greater simplicity than *k* makes a difference to the ratio of the likelihoods of *h* and *k* (i.e., to pr(*e*|*h*)/pr(*e*|*k*)) and thereby makes a difference to the degree to which *e* confirms *h* as compared to the degree to which *e* confirms *k*.[7]

[7] In addition to the "likelihood framework", Sober (2015:128–48) also endorses the Akaike Information Criterion as accounting for appeals to simplicity in some scientific cases. But as Sober emphasizes, this approach aims to explain how much weight simplicity deserves to receive when we evaluate theories for their predictive accuracy. Purported rational reconstructions are not aiming to make accurate predictions. Therefore, I do not try to apply this approach to the case of rival rational reconstructions. In considering whether the likelihood framework can be applied to the dispute between nominalism and platonism regarding mathematical abstracta, Sober (2015:273) finds himself considering pr(*e*|*h*) where *e*

In particular, Huemer and Sober propose that typically, a simpler scientific theory has fewer adjustable parameters (e.g., because it posits fewer entities or because it has lower-degree equations). With fewer adjustable parameters, a simpler theory accommodates a narrower range of data and so typically assigns higher probability (density) to each of those data sets that it allows (Huemer 2009:222–23). Thus, if h is simpler than k, then typically $\mathrm{pr}(e|h)/\mathrm{pr}(e|k) > 1$ if e is one of the data sets permitted by both theories. Therefore (by the equation in the previous paragraph), $\mathrm{pr}'(h)/\mathrm{pr}(h) > \mathrm{pr}'(k)/\mathrm{pr}(k)$, which (under one standard measure of degree of confirmation) is the fact that e confirms h more strongly than e confirms k. (Although this stronger confirmation ensures that $\mathrm{pr}'(h)/\mathrm{pr}'(k) > \mathrm{pr}(h)/\mathrm{pr}(k)$, it does not ensure that $\mathrm{pr}'(h)/\mathrm{pr}'(k) > 1$ since it could be that $\mathrm{pr}(h)/\mathrm{pr}(k) << 1$, outweighing the influence of the likelihood ratio. But it is correct for the "likelihood framework" to leave room for this possibility, since h's being simpler than k is only one of the considerations influencing the posterior probabilities; it can be overridden by other considerations.)

Sober (2015:103-4) gives an elementary example of how this account explains simplicity's impact on confirmation in science. Suppose that e is the fact that two students turned in word-for-word identical papers. *CC* ("common cause") is that the two students collaborated whereas *SC* ("separate causes") is that they worked independently. Intuitively, *CC* is much simpler than *SC*; *SC* would require an extremely unlikely coincidence in order to yield e. This intuition is captured by the "likelihood framework" since the likelihood ratio $\mathrm{pr}(e|CC)/\mathrm{pr}(e|SC) >> 1$. Sober (2015:148-9) argues that this approach is able to account for simplicity's epistemic relevance in many examples from the history of science, such as that the Copernican model of the heavens was simpler and therefore more strongly confirmed than the Ptolemaic model by the fact that each of the superior planets reaches maximal brilliance at opposition.

It seems to me that this approach nicely captures how the simplicity of Quine's account affects its confirmation. In the above example involving the two students, *SC* would require an unlikely coincidence in order to yield e -- namely, that two independent causal processes yield word-for-word identical papers. Likewise, Quine's opponent in "Two Dogmas" requires an unlikely coincidence: two entirely different explanations (one for beliefs regarding basic analytic truths, the other for beliefs regarding certain core synthetic truths) that converge to yield exactly the same regress-stopping power. Quine's proposal is simpler in not having to posit two independent "mechanisms" that happen to converge on the same regress-stopping power. This difference in simplicity is nicely captured by the ratio of likelihoods. With a common mechanism generating the epistemic status of both kinds of beliefs, we would expect

is a mathematical necessity, such as that 13 is prime (and h is either nominalism or platonism). Regarding the likelihood framework's applicability to such a case, Sober does not raise the objection that $\mathrm{pr}(e|h)$ is guaranteed to be 1 because the probability calculus presupposes that any tautology is assigned probability 1. Rather, Sober (2015:275) is prepared to treat such an e as functioning as an observation report. In like manner, I will presume that logical omniscience (as presupposed in taking rational credences to be probabilities) does not trivialize any of the probabilities under discussion. (Perhaps although the relevant facts are mathematical or metaphysical necessities, they are not narrowly logical necessities and so evade logical omniscience.)

the beliefs to have the same regress-stopping power. But it is much less likely for two separate mechanisms to coincide in supplying the same regress-stopping power.

This contrast is analogous to the contrast between *SC* and *CC*. Suppose that *e* specifies that various beliefs have the same regress-stopping power. Let *common mechanism* be the theory that there is a single (unspecified) mechanism that is responsible for determining the epistemic roles (whatever they may be) of all of these beliefs. Let *separate mechanisms* be the theory that different (unspecified) mechanisms are at work in these cases. Then the likelihood ratio pr(*e*|*common mechanism*) / pr(*e*|*separate mechanisms*)>>1.

It seems to me that the "likelihood framework" assigns simplicity less epistemic weight in the choice between rival philosophical accounts of scientific explanation. For several distinct mechanisms responsible for explanatory power to supply various scientific theories with explanatory power would not require as much of a coincidence as would be required for several distinct mechanisms to supply various beliefs with the same regress-stopping power. That is because this regress-stopping power is very specific, whereas explanatory power is not. Explanatory power arguably involves the power to give true direct answers to why questions, the power to figure in true "because" claims, and the power to supply understanding. But none of these consequences (or constituents) of explanatory power reveals it to be a highly specific achievement. For instance, Lipton (2009) argues that understanding is a byproduct even of many non-explanations (such as analogies, images, physical models, thought experiments, and tacit knowledge). Insofar as the products (or components) of scientific explanation are easier to produce, it becomes less coincidental for multiple mechanisms to be capable of producing them. Thus, the likelihood ratio between the two accounts of explanatory power's source (one account positing many different sources, the other only one) becomes nearer to unity. In short, the target is narrower in the case of regress-stopping power than in the case of explanatory power; for a narrower target to be hit by each of several separate means is typically less likely than for a broader target to be hit by each of several separate means.

There is another difference between the case of rival philosophical explications of regress-stopping power and the case of rival philosophical explications of explanatory power – a difference that, on the likelihood framework, can account for a difference between these cases in the confirmatory significance of a proposed explication's simplicity. There are only two kinds of belief that Quine's opponent recognizes as having regress-stopping power: beliefs about basic analytic truths and beliefs about certain core synthetic truths. I refer to them as two "kinds" because Quine's opponent, though opposed to a single account covering both, concedes that for each of these categories, there is a single mechanism responsible for its regress-stopping power. By contrast, as I mentioned earlier, the philosophical literature includes papers recognizing what appear to be many more than two varieties of scientific explanation. Of course, whether these varieties all in fact possess explanatory power in science is philosophically controversial. But for the sake of argument, we are presuming that most of them are indeed explanatory so that we can ask whether an account of scientific explanation would gain plausibility by virtue of unifying them – that is, by virtue of its simplicity in having only a single model of explanation for them all.

Roughly speaking, it is more difficult (ceteris paribus) to give a single, unified account of *many more* things than to give a single, unified account of *fewer* things. To put the point in terms of likelihoods: If there is a single, common mechanism responsible for all instances of explanatory power, then it is less likely that there will appear to be so many, diverse kinds of explanation than that there will appear to be fewer of them. These considerations suggest that if *e* describes the apparent diversity of the cases remaining to be unified, not merely that they share a given (explanatory or regress-stopping) power, then pr(*e*|*common mechanism*) is lower in the case of explanatory power than in the case of regress-stopping power. This influence thus contributes toward making the likelihood ratio pr(*e*|*common mechanism*) / pr(*e*|*separate mechanisms*) lower in the case of explanatory power than in the case of regress-stopping power. We have here, then, a second reason for simplicity to carry less epistemic weight in deciding among rival accounts of scientific explanation than in deciding between Quine and his opponent.[8]

As I mentioned earlier, I do not insist on my estimate of simplicity's relative epistemic weight in these two examples. More important is that the "likelihood framework" allows simplicity to carry different weights in different philosophical cases and identifies some factors that would affect its weight. Even if different agents may reasonably differ somewhat in their estimates of simplicity's relative weight in my two philosophical examples, I believe that an agent's opinion regarding how these examples compare in the factors that I have identified should align with her opinion about simplicity's relative weight in the two examples. The likelihood framework accounts for this alignment.

The likelihood framework thus seems to underwrite simplicity's possessing some epistemic relevance in these two examples, though to different degrees. Nevertheless, contrary to Huemer and Sober, I am not confident that the "likelihood framework" captures simplicity's role in some instances of scientific (or philosophical) theory-choice. To illustrate my concern, return to Sober's example of the two students who turned in identical papers. If *SC* is merely that the two students worked independently, then as we saw, the likelihood ratio pr(*e*|*CC*)/pr(*e*|*SC*)>>1, yielding the impact on confirmation of *CC*'s having greater simplicity than *SC*. But consider *SC′*: that the two students worked independently but arrived at papers that were word-for-word the same. Then pr(*e*|*SC′*)=1 and so the likelihood ratio is about equal to unity. Nevertheless, *CC* is intuitively simpler than *SC′* for the same reason as *CC* is

[8] One of Sober's (2015:257) reasons for deeming the "likelihood framework" unable to support a simplicity argument favoring the mind/body identity theory over dualism is that he believes that no assignment of a value to pr(positive association between pain reports and c-fiber scans|being in pain is not identical to having c-fibers fire) is defensible; there is no basis (such as frequency data) for making any particular assignment. Sober might likewise maintain that no assignment of values to pr(*e*|*common mechanism*) and pr(*e*|*separate mechanisms*) is defensible. However, if *e* is simply that the two types of belief have the same power (or impotence) to end justificatory regresses (or that the two types of fact or argument have the same explanatory power -- or impotence), then automatically pr(*e*|*common mechanism*)=1, since *common mechanism* says that the epistemic roles of the two types of belief (or the explanatory powers of the two types of facts) are determined in the same way by the same considerations in the two cases. As for pr(*e*|*separate mechanisms*), there is no particular value that my arguments presume that it be assigned; my arguments depend only on its being assigned some value or other that is much (or slightly) smaller than 1. I have tried to indicate what would make some such assignment defensible.

intuitively simpler than *SC*. (Likewise, suppose that *separate mechanisms′* says that different mechanisms are at work in fixing the epistemic statuses of the two kinds of belief, but the two mechanisms converge on the same regress-stopping power. Then pr(*e*|*common mechanism*) = pr(*e*|*separate mechanisms′*) = 1.)

Huemer (2009: 224–25) recognizes that when a complicated model's adjustable parameters have been adjusted to yield the evidence, then the likelihood ratio will no longer reflect the two theories' relative simplicity. But, he says, "when we exchange models for specific theories in this way, we increase the likelihoods of the resulting theories at the price of lowering their prior probabilities." In other words, that *CC* is simpler than *SC′* is reflected in pr(*CC*)/pr(*SC′*) >> 1, since only a small fraction of pr(*SC*) will fall on the parameters' specific values in *SC′*. Huemer believes that the ratio of the priors thereby captures the impact on confirmation of *CC* having greater simplicity than *SC′*.

However, even if the ratio of the priors strongly favors *CC* over *SC′* (and so – with the likelihood ratio at about unity – the ratio of the posteriors also strongly favors *CC* over *SC′*), it does not follow that the degree to which *e* confirms *CC* is greater than the degree to which *e* confirms *SC′*. For instance, suppose that pr(*e*|*CC*) = pr(*e*|*SC′*) = 1. Then by Bayes' theorem, pr′(*CC*)/pr(*CC*) = pr(*e*|*CC*)/pr(*e*) = 1/pr(*e*) = pr(*e*|*SC′*)/pr(*e*) = pr′(*SC′*)/pr(*SC′*). So by one standard measure of the degree to which *e* confirms a given hypothesis (namely, the ratio of its posterior to its prior), *e* confirms *SC′* to the same degree as it confirms *CC* despite their difference in simplicity. (This is the same measure of degree of confirmation that was used in the original argument given above that the "likelihood ratio" captures the fact that *e* confirms *h* more strongly than *e* confirms *k* when *h* is simpler than *k*.) Of course, in the light of *e*, *CC* will remain much more plausible than *SC′* (because of the ratio of their priors). But as I mentioned above, the aim was to use this apparatus to construe "simpler theories as tending to be *better supported* by the data which they fit than are more complex theories which fit the data equally well" (Huemer 2009:221). We have not wholly succeeded at achieving this aim if "better supported" means having a greater ratio of posterior to prior. On the other hand, to account for the confirmatory impact of *CC*'s being simpler than *SC′*, perhaps it suffices to explain why *CC* is much more plausible (after *e*'s discovery) than *SC′*.

Despite this concern, I see no reason to regard the "likelihood framework" as any less applicable to simplicity in *philosophical* theory-choice (at least where the choice is between rival rational reconstructions) than to simplicity in *scientific* theory-choice. I thereby disagree with Huemer and Sober. My concern above regarding the likelihood framework arises in the same way in both scientific and philosophical cases.

Let's now turn to an alternative account of simplicity's impact on confirmation that avoids this concern because it treats *SC* and *SC′* alike.

4 IV

On my reading, Quine argues for his account over his opponent's partly on the grounds that his explanation is simpler: a belief's regress-stopping power receives

the same explanation whether that belief concerns basic analytic truths or core synthetic truths. Why does the simplicity of Quine's proposal count in its favor? The likelihood framework gives one answer – an answer that is also applicable to simplicity's role in some cases of scientific theory-choice. Here is an alternative answer that is likewise applicable to some cases of scientific theory-choice.

There have been many occasions when the same specific phenomenon has been exhibited by otherwise apparently disparate systems. On many (though certainly not all) of these occasions, the common phenomenon has turned out to have the same explanation in all of these systems. The discovery of each of these shared explanations is (ceteris paribus) some evidence that the regress-stopping power common to the two kinds of belief likewise has a common explanation. The discovery that one of these other phenomena has a simple explanation supplies stronger confirmation (ceteris paribus) of Quine's proposed simple explanation over its more complicated rival insofar as we justly believe that the other phenomenon's explanation is probably similar in its general architecture to the explanation of the regress-stopping power with which Quine is concerned.[9]

There are many famous episodes in the history of science where similar features in otherwise disparate systems were found to have a common explanation. For instance, in his first paper on special relativity, Einstein (1905) noted that two systems purportedly involving different absolute motions (but the same relative motions) of their component conductors and magnets exhibit the same induced electric currents. He hypothesized that those currents have the same explanation (contrary to the received view, according to which one system's current arises from electric forces and the other's from magnetic forces). There are similar episodes in the history of mathematics. For example (Koppelman, 1971), as early as 1695, Leibniz noticed this striking similarity between exponentiation and differentiation:

Exponentiation: If f and g are numbers and n is a natural number, then

$$(f+g)^n = \sum_{k=0}^{n} \binom{n}{k} f^{n-k} g^k$$

where $\binom{n}{k} = n!/k!(n-k)!$.

Differentiation: If $f(x)$ and $g(x)$ are n-times differentiable functions of real numbers x, and if $f^{(n)} = \frac{d^n f}{dx^n}$ is the n^{th} derivative of f (and the 0th derivative of f is f), then

[9] Along with the "likelihood framework" and the approach using the Akaike Information Criterion (see note 7), Sober (2015:100, 217) also speaks favorably (though very briefly) of a third "parsimony paradigm" in science, namely, where greater parsimony is identified with having higher "non-first priors", that is, higher credence based on good empirical reasons provided by data regarding past relative frequencies. The approach to simplicity in philosophical theory-choice that I am pursuing in this section could be understood as falling under this "parsimony paradigm". (For more on this approach in the context of scientific theory-choice, see Lange 2022.)

$$(fg)^{(n)}(x) = \sum_{k=0}^{n} \binom{n}{k} f^{(n-k)} g^{(k)}(x)$$

Much later, it was discovered that as Leibniz suspected, this similarity in the two expansion formulas is no coincidence; it is not "founded on accidental analogy" (Gregory, 1841:iv). Rather, it arises from the fact that the binomial theorem holds of any commutative ring.

My point is that many striking similarities among otherwise disparate systems (in science and mathematics) have common explanations, and the prevalence of such explanations tends to count as evidence for hypotheses proposing other such explanations. In this way, *CC* derives some support over *SC* and over *SC′*. (This account of simplicity's confirmatory impact allows *CC*'s greater simplicity to have the same impact whether *CC* is being compared to *SC* or to *SC′* – by contrast with the "likelihood framework", as I described at the close of the previous section.) For the same reason, the simplicity of Quine's proposal counts in its favor.

This view assigns simplicity less epistemic weight in evaluating rival philosophical accounts of scientific explanation than in evaluating the two rival views of analyticity *if* we grant the two contrasts between the explanation and analyticity cases that I mentioned in the previous section. First, being a scientific explanation is a much less specific property than (for example) having induced an electric current of a given magnitude and direction (in Einstein's example) or having a given mathematical form when expanded (in Leibniz's example). Second, special relativity unified electricity and magnetism, each of which had already been accorded its own separately unified treatment by Maxwell and his predecessors, just as Quine's theory aims to unify what were already taken to be two different kinds of beliefs. By contrast, a single comprehensive theory of scientific explanation would have to unify many more than two apparently distinct varieties of explanation. Unity in greater apparent diversity is rarer than unity in lesser apparent diversity. So past discoveries of unities do more to favor a simple, single-mechanism account of regress-stopping power than to favor a simple, single-mechanism account of scientific explanatory power.

It might be objected that we have insufficient evidence that philosophy is like science to justify using the truth of simple scientific explanations as any evidence at all for the truth of proposed simple philosophical explications.[10] One way to reply is to consider not only cases of simple scientific explanations, but also cases of simple explanations in mathematics (like the one I just mentioned).[11] Simple explanations in other fields (e.g., linguistics) might be invoked as well. Some of these explanations are more like philosophical explanations in that, for instance, they do not work by describing causal relations. But even some simple scientific explanations appear very similar to some proposed simple philosophical explications.

For instance, Quine's account avoids having to posit two separate "mechanisms" underwriting the same specific power in cases having no other differences that we can

[10] Huemer (2009:228) offers such an objection to an "empiricist" rationale for simplicity in philosophy. That rationale presupposes that science has been highly successful at identifying true theories, whereas the rationale that I am proposing is concerned with true *explanations* in particular.

[11] For more examples and discussion of such explanation in mathematics, see Lange 2017.

appreciate independently. In this respect, Quine's account is very similar to Einstein's account. In Einstein's example of two cases involving a magnet and a conductor, all of the observed features of the two cases (the induced currents, the relative motions) are the same. According to Einstein, all of the differences traditionally alleged to hold between the two cases lie in various respects traditionally posited as figuring in the theoretical mechanisms (electric and magnetic forces and fields) operating in the two cases. All of these alleged differences are dispensed with in Einstein's simpler proposed mechanism. In the same way, regarding beliefs directed at basic analytic truths and core synthetic truths, Quine holds that these beliefs are alike in all of their features (such as being held with great confidence and having the capacity to end epistemic regresses of justification) that we accept independent of accepting any theoretical account of the "mechanism" by which these beliefs acquire these features. According to Quine, all of the differences traditionally alleged to hold between the two cases lie in various respects traditionally posited as figuring in the theoretical mechanisms (meanings, synonymy, etc.) operating in the two cases.[12] All of these alleged differences are dispensed with by Quine's simpler proposed mechanism. This similarity between Einstein's explanation and Quine's proposed explanation allows the success of Einstein's explanation to add epistemic weight to the simplicity of Quine's theory.

5 V

My estimate of the relative weight that simplicity should have in the analytic/synthetic and scientific explanation examples may well be mistaken.[13] I have obviously omitted many important aspects of these examples. My main aim is to understand better the rationale (if any) for philosophers' appeals to simplicity in support of one rival rational reconstruction over another. For these purposes, it would suffice for my account to identify the role that simplicity *would* play in these two examples *if* my caricatures of them captured their major features.

One lesson I draw from these examples (despite any inadequacy in my descriptions of them) is that the weight that simplicity should receive in evaluating rival rational reconstructions differs from case to case; the rationale for appealing to simplicity is sensitive to case-specific details. The factors that I have identified in these two examples may help to make simplicity more significant in one of these examples than in the other even if these factors are not the only ones at work in these two examples. The key point is that on my account, an agent's view of factors like those that I have identified should align with her estimate of simplicity's epistemic weight. That simplicity carries more weight in one case than in another – and that its weight aligns with factors like those that I have identified – is true in scientific theory-choice as well.

I have suggested that the most promising grounds for appealing to simplicity in scientific theory-choice also apply to appeals to simplicity in the choice among rival

[12] See note 5.

[13] For instance, Nickel (2010) argues that all explanations have substantial features in common.

rational reconstructions. So far, I have not questioned Sober's and Huemer's conclusion that the same grounds generally fail to support appeals to simplicity in various ontological inquiries in philosophy. But if Sober and Huemer are correct in regarding simplicity as typically irrelevant to philosophical work in ontology, then there will likely be some unfortunate tensions between the results of our rational reconstructions (guided, in part, by appeals to simplicity) and the results of our ontological inquiries (where, on their view, simplicity should typically play no role).

For example, if Sober and Huemer are correct, then we should not be surprised if it turns out that our best rational reconstruction of what objective chances would be, in order for our beliefs about them to play the roles they do in rationally guiding our credences, conflicts with the result of our best ontological inquiry into what there is. This conflict would seem to suggest that our practices of reasoning in terms of objective chances fail to answer to what there is and so should be changed, at least in some respects.

Similarly, some Humeans about laws of nature (e.g., Loewer 2004:1120) have suggested that our best rational reconstruction of the way we reason about natural laws will stand in sharp tension with our best ontological inquiry regarding what it is to be a natural law. These philosophers contend that a non-Humean conception of laws will figure in our best rational reconstruction of our inferential practices involving lawhood. By contrast (according to these philosophers), our best metaphysics suggests that there are no non-Humean laws – no necessary connections in nature. These philosophers propose that our inferential practices involving lawhood be amended accordingly (and that any intuitions favoring a non-Humean conception be set aside).[14]

In short, if simplicity functions differently in our efforts to provide rational reconstructions than in our ontological inquiries, then ontological inquiries must often motivate revisions to our practices. On the other hand, we might instead believe that such revision is usually unwarranted in the case of practices that seem in all other respects uncontroversial and successful; we might believe that typically, philosophy should not challenge established practices in this way. This view would give us some reason to expect that there will turn out to be no such tension between ontology and rational reconstruction – that upon closer examination, simplicity will typically turn out to be as justly relevant to ontological investigations as it is to rational reconstructions. This view would then give us some reason to doubt Sober's and Huemer's conclusion that simplicity has no role in ontological inquiries.

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[14] Of course, no tension would arise between our ontological results and our rational reconstructions if we refrained from engaging in any ontological investigations – as Carnap urges in regarding external questions as empty (unless understood as pragmatic). (See note 2.) Although Sober (2015:273, 283) seems sympathetic to Carnap's view, I am not prepared to take this drastic way out.

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