The Role of Pragmatics in Contemporary Philosophy: Contributions of the Austrian Ludwig Wittgenstein Society
Paul Weingartner, Gerhard Schurz, and Georg Dorn, eds. (Vienna: Hölder-Pichler-Tempsky, 1997)

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OCKHAM'S DISPOSABLE RAZOR

'Frustra fit per plura quod potest fieri per pauciora.'
—William Ockham

1. Introduction

Ockham's Razor is usually formulated this way: 'Do not multiply entities beyond necessity.'[1] David Armstrong (Armstrong 1989, pp. 19-20) glosses it thus: 'in general, the theory that explains the phenomena by means of the least number of entities and principles (in particular, by the least number of *sorts* of entities and principles) is to be preferred.' Bertrand Russell (Russell 1914, p. 107) restates it as 'in dealing with any subject matter, find out what entities are undeniably involved, and state everything in terms of these entities.' David Lewis gives perhaps the clearest accounting of OR, writing

> Distinguish two kinds of parsimony, however: qualitative and quantitative. A doctrine is qualitatively parsimonious if it keeps down the number of fundamentally different *kinds* of entity: if it posits sets alone rather than sets and unreduced numbers, or particles alone rather than particles and fields, or spirits alone rather than both bodies and spirits. A doctrine is quantitatively parsimonious if it keeps down the number of instances of the kinds it posits; if it posits 10^{29} electrons rather than 10^{37}, or spirits only for people rather than spirits for all animals. I subscribe to the general view that qualitative parsimony is good in a philosophical or empirical hypothesis, but I recognize no presumption whatever in favor of quantitative parsimony. (Lewis 1973, p. 87).

In short, OR enjoins us to try to minimize the number of entities or types of entities in our ontology. Put another way, it tells us that when considering two theories, we are to choose the one, *ceteris paribus*, with fewer entities, or types of entities.

Ockham's Razor is enormously popular. For example, Russell calls OR 'the maxim that inspires all scientific philosophizing.' (Russell 1914, p. 107). Geoffrey Hellman and Frank Thompson equate OR with no less than 'sound scientific procedure' itself, as does William Lycan.[2] Similar accolades can be found in the

* Thanks to Richard Brook and Steven Rieber for earlier criticisms of this paper.

1 Although not by Ockham himself, who offers versions like that in the epigraph: what can be explained by the assumption of fewer things is vainly explained by the assumption of more things.

2 (Hellman and Thompson 1975) p. 561. Cf. (Lycan 1975) p. 224. Lycan argues that we must rely on principles of parsimony. Added to the results I argue for presently, this yields a

writings of other philosophers as well. Yet it has rarely been subjected to rigorous, critical assessment; even the motivation for OR is a mystery. Is its use supposed to help us winnow out false theories in favor of true ones? Or is it a pragmatic principle that aids in the generation of easier to use (and thus preferable) theories? I will argue that on either conception, it is either a mistake to use Ockham's Razor or it is beneficial only in a logically trivial way.

2. The Alethic Conception

There is a difficulty in using OR to adjudicate between rival global ontologies. For example, consider two Platonist ontologies, both committed to as many abstract objects as there are numbers. How could even Lewis's qualitative parsimony provide a way to decide between them? Yet even if global ontologies are likely to have entities in such numbers that OR cannot choose among them, there still may be a use for the razor on a smaller scale. For example, if we are choosing between Ptolemaic and Copernican astronomy, OR might be just the tool to eliminate those unwieldy epicycles. Why should one prefer the less cumbersome Copernican system? One reason is that doing so—using Ockham's Razor—will help us to gain truth and avoid error. Parsimonious theories are likelier to be true than unparsimonious ones.[3] This means that between two competing theories with a finite number of entities or types of entities, the one with the fewer number is likelier to be true.

Here is an argument against this alethic conception of OR. Either OR is to be applied *ceteris paribus*, or it is not. If not, then OR will prefer the ancient Greek list of elements, with its four types (earth, air, water, and fire), over the modern periodic table, with its 110 types of elements. Modern chemistry is much less parsimonious than ancient chemistry. Yet it is the modern theory that is universally accepted, and, we may suppose, that one that is much likelier to be true. So as an unqualified principle, OR is false. Suppose then that OR is a *ceteris paribus* rule, not an inviolable axiom for theory preference. That is, if you have two competing theories, equal in all other respects (data retrodiction, prediction of novel phenomena, coherence, symmetry, logical rigidity, etc.), then you should prefer the one with fewer items or types of items. It is the one more probably true.

While this version of OR is not obviously false, it is difficult to see what would count as evidence of its truth. Even if we are able to judge theory A as superior to theory B on parsimonious grounds, why should this lead us to conclude that A is more likely to be true? Remember, we are supposing that the two theories are equal in all respects save the number of entities they countenance. They both predict and retrodict the same data, have the same internal rigidity, and so on. Without simply assuming that parsimony grants the mantle of truth, it is hard to see why we should

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disturbing skepticism.

[3] Endorsement of this interpretation is explicit in, e.g., (Dowden 1993) pp. 372-373; and (Sober 1990). Cf. the latter for further reasons to reject the alethic treatment of OR.

think B is likelier to be false than A.

Alternatively, one might argue inductively as follows. Historically, we have seen competing explanatory theories that, at some time in the past, were thought to be equal in data retrodiction, prediction of novel phenomena, etc. At some later time, one of the theories proved to be superior at (say) predicting novel phenomena, and so was adopted over its competitor. When this has happened, the winning theory has always (or usually) been the more parsimonious theory. Thus parsimony is an indicator of the future success of a theory.

This argument could be correct. However, there is a fair amount of historical research that must be done to establish its premises. There is no *a priori* reason to accept any one of them, especially the claim that parsimony has attended success. Indeed, a cursory glance at the history of ideas suggests a progression from relatively sparse ontologies to more plentiful ones—the discovery of more types of particles, more biological species, and more galaxies seems the rule, not the exception. It could also be the case that OR is a good indicator of future success in some domains and not others. For example, it could turn out to be contingently true that OR has been a good predictor in geology but not evolutionary theory. Notice that this means that OR would not be axiomatic, *a priori*, or universally applicable. Thus, pending the necessary historical investigations, I will set this argument aside.

3. The Pragmatic Conception

Even if Ockham's Razor does not help us in the pursuit of truth, it may still have some pragmatic or prudential value. Consider our earlier example of two theories each with a finite number of postulated entities or types of entities. Suppose that theory A includes fewer entities than theory B. We have seen that OR gives us no reason think that A is likelier to be true, but perhaps it gives us a reason to prefer A to B on the grounds that A is simpler, less cumbersome, and more practical to use. We should expect a theory that postulates two or three basic entities to be easier to understand and employ than a theory with a dozen. Thus OR can prefer Copernican astronomy to Ptolemaic just on the grounds that it is just easier to work with. All the phenomena are saved with a more digestible, and hence preferable, theory.

Again we must consider whether OR, in its new pragmatic guise, is to be understood *ceteris paribus* or not. If not, then it will still select ancient Greek chemistry (with its four elements) over the modern periodic table (with its 110). This may be fine in everyday life where an awareness of fire is more important than a sensitivity to Hahnium, with its half-life of less than two seconds, but it is clearly a serious mistake if OR is taken as a real guide to which theory we should accept as true. Rigid adherence to OR would lead to a science that is wildly askew. Nature is not always easy, and pragmatically insisting that it be so is sure to stifle our under-

standing.[4] Let us suppose then that our pragmatic OR is to be understood *ceteris paribus*.

Sometimes a theory with fewer basic types of entities will be easier to use than a theory that does all the same work with more. However, this is not always the case, and as a universal generalization, even the pragmatic *ceteris paribus* reading of OR is false. Recall Lewis's parsimonious preference for doctrines that posit sets alone, à la Russell and Whitehead, rather than both sets and unreduced numbers. How could this preference possibly be rooted in *pragmatic* considerations? That would be to suppose that there is a practical advantage to employing a theory the length and complexity of *Principia Mathematica* over the old, bad, doctrine of sets and unreduced numbers. *Principia* is a magnificent achievement of considerable epistemic interest and even beauty, but surely it did not make mathematics easier or simpler in any prudential sense. The appeal of *Principia* is not a pragmatic one.

Perhaps we have erred in focusing solely on the numerical aspect of Ockham's Razor. OR also instructs us not to increase entities *beyond necessity*. If you need events or limits or numbers or virtual particles to understand the world, then by all means, help yourself. But don't add superfluous items. Quine puts it, 'pad the universe with classes or other supplements if that will get you a simpler, smoother overall theory; otherwise don't.' (Quine 1976, p. 264). Quine's Razor is like a sign above a buffet: take all you want, but eat all you take.

If this is all OR comes to, then it is trivial. It no longer urges us to be ontological misers, but rather not to engage in conspicuous consumption. That is, OR says to include in a theory only things that are essential to make it work. Thus, for example, we shouldn't postulate a guardian angel for every event, as event theory is self-sufficient without the angels and countenencing angels does not increase the theory's explanatory power. While good advice, it is trivially so. It is an analytic truth about explanation that if A, B, and C explain Z, and A and B explain Z just as well, then C plays no role in the explanation of Z. Hence to say, as OR does, 'get rid of C on the grounds that it is not necessary to explain Z' is trivial because it was never part of the explanation to begin with. It never helped explain anything, therefore it could not have been part of an explanation of anything; it was never part of the theory about Z. It would be a complete mistake to imagine that we once had a theory about Z that involved A, B, and C, and now we have a new, superior theory about Z that is C-free. This may be what Wittgenstein is getting at when he wrote in the *Tractatus*, "If a sign is *useless*, it is meaningless. That is the point of Occam's maxim." ((Wittgenstein 1961) §3.328. Cf. §5.47321.)

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4 These reflections seem to underlie Santayana's suggestion that "Occam's Razor... as a criterion of truth, is the weapon of a monstrous self-mutilation with which British philosophy, if consistent, would soon have committed suicide." (Santayana 1942) p. 510.

4. Conclusion

There are many reasons to prefer one theory to another, reasons having to do with fecundity, explanatory power, or just plain elegance and beauty. Steven Weinberg, for example, argues that it is the holistic unity of a theory, along with its seeming inevitability and symmetry in its laws that help make one theory superior to another.[5] He writes that when we 'have a complete theory of the sort we want... it will not matter very much how many kinds of particle or force it describes, as long as it does so beautifully, as an inevitable consequence of simple principles.' (Weinberg 1992, p. 149). Weinberg is certainly correct to think that the numbers do not ultimately matter. In many theories—global ontologies for example—the numbers are so large that they cannot matter. In other, local, theories, obsession with numbers is liable to lead us to theories that are false or unreasonably hard to use. If we look carefully at the reasons one theory wins out over another, ontological parsimony proves to be a red herring. Copernican astronomy would never have supplanted Ptolemaic if the latter were the more effective in describing nature. Attention to the numbers of entities or types of entities neither aids in the search for truth nor ensures ease of use. Whatever the principles are that we should adopt to guide our choice of theories, Ockham's Razor is not one of them.

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5 See chapter six, "Beautiful Theories" in (Weinberg 1992).

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