Three Skeptics' Debate Tools Examined

Occam's razor, assigning burden of proof, and Sagan's phrase about extraordinary claims are often misunderstood. In a debate it always pays to know why these tools work.

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Every skeptic should have a toolbox full of debate gadgets to help and guide him or her when confronted by believers of all flavors. This box should include a burden-of-proof compass. It's a useful gizmo that points to whoever has to prove his or her claims. It should be well calibrated; else it tends to always point away from you. You will also need a razor, by Occam, to cut through the boneless lard of unnecessary entities. It should be sharp—unnecessary entities are soft but they can be thick. There are other fine precision instruments, but if you want to be on the cutting edge of skeptic technology you will want the latest rage: a Sagan balance. This fine instrument is designed to measure how extraordinary a claim is, because you should not be

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satisfied by a proof that is less extraordinary than the claim it purports to prove.

Thus armed, you are ready to charge bravely into the world, ready to tackle any irrational member of your community. But be careful, for sooner or later you are bound to run into an old goat like myself who will take your tools to task.

Every time you pull out your balance and say, "Extraordinary claims require extraordinary proof," I will put your balance on mine, replaying, "Say, that's an extraordinary claim . . . Got proof?" Every time your compass points at me I'll produce one that points at you, by stating that you have the burden of proving that the burden is mine. And every time you pull out your Occam's razor, I will pull mine, asking if your razor is not really a superfluous entity, which should be cut away. Would you be ready to justify the use of your tools?

My sad experience debating in electronic chat-rooms, e-mail lists, classrooms, and elsewhere, is that not many would be. But as faith-mongers are quick to point out, if skeptics cannot justify rationally their views, they are no better than those who proudly take their claims on faith. So let's take a closer look at each of them. If my analysis is wrong, arguing against me will clarify your own ideas, thus sharpening your tools.

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Occam's Razor

Let's start with the venerable razor. Why exactly should we prefer Theory A to Theory B whenever Theory A is more economical?

I have found that the most frequently quoted reason is that nature *is* parsimonious; that it "prefers" an economy of means. This is at best a very peculiar metaphysical claim, and a bad one. If this is taken to be "an axiom of reason" and no further justification is offered, it is indeed no better than faith, for it is certainly not self-contradictory to deny it.

When this is pointed out, many fall back to the softer empiricist idea that we know by induction that nature in fact is economical in its means. However, this seems to me just plain false. I find nature to be rather exuberant: There are millions upon millions of stars in each galaxy of which there are millions. Every day several new species are discovered and usually more than one compete for the same ecological niche. Many organisms reproduce by the hundreds or even thousands, so a few will reach adulthood. Organisms often have more than enough organs to survive (two kidneys, two lungs, etc., when you can live with one of each). Organisms reproduce by means of a genetic code that has large sections that encode nothing. There are more than a hundred elements, most of which are pretty stable. There are several dozens elementary particles. If you are partial to superstring theory, you will need no fewer than ten dimensions. . . . Nope, nature is not simple.

But if that's the case, why should we prefer economical theories? Shouldn't we indeed cut away the razor? On the

contrary, it is precisely because we find nature to be complex that we should prefer simple theories.

Suppose we had an epistemic apparatus (sense organs and brain connections) that allowed us to apprehend in all its complexity any part of nature that we cared to pay attention to. Nature might appear to us boringly simple, but there would be no question about preferring simple theories to complex ones. We could state how nature is in *all* its complex detail immediately.

But we cannot do that. Instead we start by noticing certain regularities, constant conjunctions, as Hume would say, patterns of events. We first posit a causal connection between the events, but often have no clue as to how those regularities occur. Then, with hard work, we may posit laws describing how regular those regularities are, but we may be completely in the dark as to what the mechanisms *behind* those regularities are. Then if we are lucky, we may perhaps glimpse the mechanism, by pointing to finer regularities that had gone unnoticed before, but again may have no clue as to how the new regularities behave, etc. That is, we learn about the world by refining what we already know.

For instance, we all learn rather quickly that unsupported objects fall to the ground. But it was no walk in the park to describe *how* they do so. Intellectual giants like Aristotle and Aquinas got it wrong. Galileo started getting it right and Newton did a brilliant job which Einstein tweaked a bit. However, Newton himself confessed explicitly that he had no idea how gravity works, and was in fact not pleased with the idea of action at a distance. Along came Einstein and refined Newton's descriptions but we still have action at a distance, and some are still not pleased. So is there an elementary particle for gravity? Or is it a wrinkling of space around matter? Invisible spiritual tentacles, perhaps? Maybe none of the above? Imagine Newton had posited that objects are held to each other with perfectly elastic, unbreakable threads so thin that they cannot be detected. Newton's theory would be worse. Clearly it is not good practice to posit hypotheses that have no good evidence in their support, but that is not all. Had Newton talked about thin threads, the theory's predictive success might lull us into thinking that the thin-thread hypothesis is correct. In confessing his ignorance about the nature of gravity, Newton pointed the way for future research. We still do not know for sure what gravity is, but some of the best minds are working on some interesting hypotheses. And it is important that they are working on them; if we thought we knew what gravity is, they might not be.

In investigating how the world is, it is essential to be aware not only of what we know, but of what we *do not* know. Occam's razor, in preventing us from going beyond the simplest description possible, is a methodological tool (certainly not a metaphysical dictum) that helps point out our ignorance. This ensures our theories are incomplete, but correctable. And that is as good as we can get with our epistemological apparatus.

Lets now take a look at the next item in your toolbox.

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The Burden-of-Proof Compass

Who does your burden-of-proof compass point to? Many have a faulty model, that points to whomever makes a positive claim. That is, it assigns the burden of proof to subject A if subject A claims X and subject B claims not-X, regardless of the content of X. This is clearly a mistake about the nature of language, for most claims, if not all, can be worded so as to include a "not" in their formulations. For instance, "gold atoms have seventy-nine protons," which would count as a "positive claim," can be reformulated as "gold atoms have no more and no less than seventy-nine protons" thus making it a "negative claim," two negative claims, actually. If that were how quality burden-of-proof compasses worked, everybody would word his or her claims in negative form, avoiding the burden of proof. So it is not.

An equally faulty but somewhat more sophisticated model points to whoever makes a claim that *implies* a "positive existential claim." This seems to solve the difficulty because both formulations above imply the same existential claims. The mechanism behind this compass model is based on the idea that negative existential claims cannot be proven. Since it would be irrational to ask someone to do something that cannot be done, the one making the positive existential claim has the burden of proof. But again, these compasses are faulty.

If the burden-of-proof compass pointed to only those making existential claims, its use would be very limited. It would leave us in the dark about who has the burden of proof when no existential disagreement exists. For instance, "gold atoms have seventy-nine protons" implies that there is gold, that there are atoms, and that there are protons. It also implies that those atoms that have seventy-nine protons make up the stuff we call gold, but that is not an existential claim. Now suppose along comes Professor Mad Chemist, claiming that gold atoms have seventy-eight protons instead of seventy-nine. We would intuitively want to say the burden of proof is on Mad Chemist, yet we cannot pin it on him. His claim implies that there is gold, that there are atoms, and

that there are protons, but the disagreement is that according to Mad Chemist, atoms that have seventy-eight protons make up the stuff we call gold. But again, that is not an existential claim, so he wouldn't have the burden of proof. Furthermore, Mad Chemist might get nasty and argue that whoever says gold has seventy-nine protons is claiming the existence of one more proton than he is, so the burden of proof is on sane chemists. Not good.

Theories are confirmed with each successful experiment, each accurate prediction, each satisfactory explanation. An established theory does not have the burden of proof because it has already been (tentatively) proven.

A second objection against the idea that the burden-of-proof compass points to the one making the positive existential claim is that a cursory glance at the history of science reveals that is not so. There are many examples of nonexistent entities that had to be proven not to exist. Phlogiston is perhaps the best-known example, along with the nonexistent element "Caloric," which supposedly accounted for the behavior of heat, but there are many others. So no, your compass should not point to the person making a positive claim of existence.

The above considerations show that the basic mechanism of these compasses is faulty; the fact is that you can prove a negative existential claim. The supposed asymmetry between proving a negative existential claim and a positive one is so widespread that it may be worth elaborating a bit. It is thought that if you are wondering whether entity X exists, you go looking for X. If you find an X, then that is that, you have proven its existence, while if you go looking for X and do not find an X, you just proved X is not where you looked for, but not that X does not exist. But things are not really that simple. First of all, you may have a theory that predicts X must appear under certain circumstances; if it doesn't appear it doesn't exist. Or through theoretical considerations you can limit the number of places where to look, so that if X does not appear in any of those places, it doesn't exist, because it won't appear elsewhere. Or, you may have some theoretical idea of the effects X should produce; no effect, no X. If you have no such theoretical constraints, if you are really supposed to look for X in every nook and cranny of the universe, you probably have no theoretical reason to suppose X exists in the first place, in which case it goes with Occam's razor.

But wait—you may say—that is cheating: If the theory predicts X will appear here and it doesn't, it may indeed be that X does not exist, but it may also be that the theory is wrong and X does exist after all, so that's no proof that X does not exist. But it's not cheating. Look at all the evidence there is for the existence of atoms (a positive claim of existence). It is equally dependent on the correctness of some accepted theory or other. All proof, including that of positive claims of existence, is theory dependent. Of course, this means that proofs are never 100 percent certain, but that is as they should be, because certainty is unattainable.

Back to the burden of proof. We are now in a position to see what the correct mechanism for a quality compass should be. A good burden-of-proof compass should point to whoever makes a claim that contradicts established theory—one that goes against the best evidence accrued. The reason is simply that theories are confirmed with each successful experiment, each accurate prediction, each satisfactory explanation. An established theory does not have the burden of proof because it has already been (tentatively) proven. A claim that goes against established theory would have to not only be proven, but preferably either subsume in corrected fashion the previously established theory, or offer some explanation as to why it seemed to work.

A word of warning: It is not always easy to determine what the best evidence is. Worse, it is not always easy to determine what the data is evidence for or against. So be prepared to engage in detailed factual and logical debates, because your burden-of-proof compass is liable to get you into uncharted territory rather than out of it.

Sagan's Balance

Let's move now to Sagan's Balance. On one hand, the idea that extraordinary claims require extraordinary evidence seems . . . extraordinary, to say the least. We would want to say that we are fair, that we judge any claim strictly on the force of the evidence for or against it, no matter if it is ordinary or extraordinary, boring or outrageous. Any claim needs good solid evidence to be proven, no more, no less. On the other hand, suppose you see a car moving down the street. That is good solid evidence for there actually being a car on the street. Now suppose you see a pink semitransparent elephant with green freckles walking down the street. Why is that not good evidence for there being such a beast on the street? The evidence is the same for each. So what do we do, are we fair (taking each observation at face value) or commonsensical (dismissing the flimsy pachyderm as a prank, a publicity stunt, or even a faulty brain)?

To answer this question we need to look at what we consider extraordinary. Thousands of previous instances of cars moving on streets tell us that cars usually populate streets, so much so that a street devoid of cars is rather eerie. In contrast, we take the pink elephant sighting to be extraordinary because past experience tells us that elephants rarely walk the streets, are usually not pink, and vertebrates are usually not semi-

transparent. Therefore it is wrong to say, as I did before, that the evidence is the same for both. The elephant sighting is extraordinary precisely because the cumulative evidence would point to there not being such a beast, whereas it would point to the car definitely being there. Thus, the fair *and* commonsensical thing to do is discard the elephant as fictitious and keep the car as real. In this sense, Sagan's Balance, is "just" a tautology: those claims that are extraordinary are precisely those that would require confirming evidence the most, because what makes them extraordinary is past experience to the contrary. But tautologies can be informative and useful. In this instance, Sagan's Balance reminds us that knowledge is a cumulative interpersonal enterprise, not a personal, subjective, and heroic quest.

These considerations may shed some light on that most vexing question every despairing skeptic poses at some point: "Why do believers believe in the face of recalcitrant evidence to the contrary?"

Past experience and theoretical considerations not only furnish explanations of our experiences, but also determine what counts as a genuine experience and what we dismiss as an artifact, mirage, coincidence, hallucination, or conspiracy. We knit a highly interconnected web of beliefs that support one another. Therefore, anyone who has spent a lifetime interpreting coincidences as poltergeists, demons, "forces," "energies," and the like will tend to explain a poorly latched window that suddenly opens as a visitation from a spirit. Likewise, such a person will dismiss or explain away any and all evidence to the contrary. After all, that is the rational thing to do given that person's epistemological baggage.

That is also why skeptics are often accused by believers of just trying to debunk, instead of having a truly open mind. The accusation trades on the ambiguity of the phrase "open mind." It often means approaching a subject with no preconceptions. In this sense, the accusation is correct but harmless. It is correct because when confronted with a claim of, say, poltergeists haunting a house, we do not believe there is a 50-50 chance of it being correct. Our real reaction, if charitable, is "hmm, probably not." We do tend to dismiss offhand such phenomena as human artifacts, and because of good theoretical and inductive preconceptions. It is harmless because no one approaches any subject devoid of preconceptions; we interpret the world through our past experience. On the other hand, "open mind" may also mean an unwillingness to change our mind; to allow our preconceptions to dominate over the evidence. In this sense, the accusation of just trying to debunk is unjustified of the skeptical stance (though surely not of all skeptics). It is not only possible, but the only rational option, to approach a subject with a willingness to change one's mind if the evidence warrants it, but with strong preconceptions about the outcome of our research.

In order to change someone's mind, be it skeptic or believer, one would have to change a large chunk of that person's web of belief. Part of the baggage of past experiences would have to be reinterpreted with wholly different explanations, explanations that are alien to that person, forcing him or her to throw out some of that person's bona fide experiences and reinstate some previously thrown out as artifacts. And that is a very difficult thing to do.

The fact that theories are incomplete and inconclusive, that observation is theory-dependent, and that beliefs are tightly knit into a web does not in any way imply that there is no way to decide between worldviews, much less that all theories are equally good, or that the scientific narrative is just one among many possible ones, or any such nonsense. On the contrary, it is precisely because knowledge is tentative and correctable that we must check and double-check our explanations, and cast, from time to time, a doubtful glance at our pet theories. But this does mean that there are no knockout punches in epistemology. The only way to proceed is one on one, infinitely patient rational debate . . . with sharp, well-calibrated, evidence-based debate tools. □