Idealization in Epistemology: A Modest Modeling Approach

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1.1.2 Propositional Logic

Even in the absence of some paradox to be dissolved, modeling frameworks can play a role in illuminating similarity or shared structure. Take the formal language of propositional logic. This can be studied in its own right as a mathematical object—it can be the subject of soundness and completeness proofs, for example. But it can also be used as a tool for studying natural language. A standard exercise in introductory logic classes involves taking a piece of natural language argumentative prose—perhaps a newspaper op-ed, or an excerpt from a philosophical text—"translating" it into the language of propositional logic, and then evaluating the translated argument for soundness and/or validity. This exercise can be fruitfully thought of as a kind of normative model-building.[30] We're interested in evaluating an argument couched in natural language. But we take an indirect route. We build a model of the natural language argument in the language of propositional logic, and then engage in the comparatively straightforward task of evaluating the model.[31] Of course, this approach involves abstracting away from a lot—sometimes so much that it's misleading; there are good arguments whose goodness isn't revealed by this method.[32] Nevertheless, the framework can be genuinely illuminating. When a student sees two superficially dissimilar pieces of natural language argument as having the same formal virtue—both are instances of *modus tollens*, perhaps—she has achieved a philosophically significant insight, despite having used idealized, incomplete models to do so.

Just how widespread is model-building in philosophy? While I've given a few clear examples from relatively technical parts of the discipline, in my view there is also a great deal of informal modeling. In fact, I'm sympathetic to a general view about reduction and emergence, inspired by Dennett (1991), explicitly generalized by Wallace (2012),

[30] See Titelbaum (2012).

[31] Straightforward at least if all we're interested in is validity. Soundness, of course, is harder.

[32] For instance, arguments whose validity is only revealed by moving to more sophisticated logics, or arguments that are not formally valid in any logic, but are still substantively reasonable.

and also arguably endorsed by Carroll (2016), to the effect that *all* discourse about non-fundamental aspects of reality—basically, everything but quantum mechanics—is fruitfully understood in terms of modeling. Just as classical mechanics is useful—when it is—because certain quantum systems can be tractably modeled as classical systems without too much loss of accuracy, so too with biology, psychology, and the everyday ontology of medium sized dry goods. I don't pretend that this is an adequate summary; I'll expand on this idea in the next chapter.

1.2 Rejecting Models

Just as one can't defend a modeling framework by arguing that it's true, one can't attack a modeling framework by arguing that it's false. But that doesn't mean that "it's just a model" can be legitimately used as an all-purpose shield against objections; there are bad modeling frameworks, and bad models. Perhaps most obviously, modeling frameworks can be useful for some purposes, or in some situations, but not others. In mechanics, models that leave out air resistance and frictional forces provide nice, simple explanations of why, *pace* Aristotle, bowling balls and basketballs will fall at roughly equal speeds, despite the former weighing much more. But using such models to predict the trajectory of a falling feather will only lead to disappointment. In philosophy, propositional logic occupies a similar role. Some natural language arguments are fruitfully modeled in propositional logic. But not all; arguments whose validity depends on their quantificational structure or on the use of modal vocabulary are not best modeled in that framework. In both of these cases, negatively evaluating the models these frameworks build is relatively straightforward. A framework that ignores air resistance, when used to model the descent of a feather, will make false empirical predictions. And propositional logic, when used to model arguments with quantificational structure, will render false verdicts about validity. What these examples illustrate is that a modeling framework can be useful and illuminating despite having less than universal scope, even

in what might have looked like its natural domain. Not all natural language arguments are fruitfully modeled in propositional logic. Not all dynamics problems are fruitfully modeled in a framework that ignores air resistance. But some of them are, and that's enough for the frameworks to be worth keeping around.

This point can be a bit surprising, so it's worth dwelling on. Given that there are modeling frameworks that take account of air resistance, and so make correct predictions concerning both bowling balls *and* feathers, why is it ever illuminating to work with models that ignore it? And given that there are more sophisticated logics that can represent quantificational, predicate, and modal structure, why should we ever model arguments using simple propositional logic? This is a big question, but I think the broad outline of the answer is relatively uncontroversial. A good explanation doesn't include unnecessary detail. In an ideal explanation, the *explanans* is as detailed as it needs to be to account for the *explanandum*, and no more.[33] This isn't merely a matter of convenience. If I explain why somebody died by saying that they were hit by a lime green, all-wheel-drive 2013 Subaru Forester, I haven't merely been unnecessarily verbose. Because the death didn't depend on the color, suspension, model, manufacturer, or year of the car, including all these details makes my explanation worse—it amounts to citing factors in my explanation that made no difference to the phenomenon I'm trying to explain. For similar reasons, in explaining physical phenomena that don't depend on friction or air resistance, models that leave out those factors aren't merely more convenient to work with that models that include them; rather, they provide better explanations that more faithfully reflect the structure of the phenomena they're meant to model. Likewise when it comes to using propositional logic rather than more sophisticated formal tools to explain what various instances of *modus tollens* have in common.

Of course, some frameworks *aren't* worth keeping around—they're not the right

[33]See especially Yablo (1992).

tools for *any* job.[34] The history of science and philosophy furnishes us with plenty of examples. Ptolemaic astronomers had detailed models of the solar system that did a more than serviceable job of predicting observed planetary motions. But today, heliocentric models are both simpler and more accurate than their geocentric predecessors. While the heliocentric framework is of genuine antiquarian interest, there are no phenomena best explained by appeal to the models it builds. Examples from philosophy are bound to be more controversial, but arguably the relationship between the framework suggested by Aristotle's writings about predication on the one hand, and the Fregean predicate calculus on the other, is similar. Plausibly, any explanation of why some natural language argument is valid that could be given by an Aristotelian logician could be given more perspicuously by a Fregean, and the Fregean would have the advantage of being able to model a wider range of logical phenomena.

The moral here is a broadly Kuhnian one, with modeling frameworks playing the role of paradigms.[35] According to Kuhn, mere anomalies, or recalcitrant data, aren't sufficient justification to reject a scientific paradigm. Instead, a better paradigm is needed. By analogy, to reasonably reject a modeling framework *tout court*—to dismiss it as incapable of providing *any* helpful or illuminating explanations, rather than just to regard it as inapplicable to certain situations—one must have in hand a strictly better framework. This is a theme I'll return to throughout the book. I'll argue that various modeling frameworks in epistemology—ones that incorporate "logical omniscience" assumptions, or which model learning by the acquisition of certainties, or which "conflate" first-order and higher-order epistemic statuses, have virtues not (yet) matched by any competitor frameworks. And so despite "anomalies"—cases in which those frameworks seem to deliver awkward results—they shouldn't be put out to pasture.

I expect that not much I've said about modeling thus far will be particularly con-

[34] I borrow the metaphor of models as tools, and the modeler as akin to a handyman with a diverse toolkit, and who uses different tools for different jobs, from Veit (2020), and I'll return to it throughout the book.

[35] See Kuhn (1962).