

The Metaphysics of Logic

By Penelope Rush (ed.)

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A study of the metaphysics of logic may seem like a non-starter. Logic is supposed to capture the most general forms of reasoning, forms that apply to any domain of objects under consideration. In this regard, it is said that logic is “topic neutral”, assuming nothing about the existence of any particular things. Penelope Rush’s volume, *The Metaphysics of Logic*, shows clearly that matters are not so simple. Upon reflection this should not come as a surprise. Logic is about consequence, about what follows from what. And if you think that there are truths about what follows from what, you might wonder what grounds those truths. Is it the way the physical world is? Is it the way the human mind is? Is it both, or something else altogether? At this point, you’re doing metaphysics.

The Metaphysics of Logic contains fourteen essays, divided into three parts. The first part, containing half of the essays, discusses different positions one can take with respect to the metaphysics of logic. These positions map onto familiar metaphysical positions one could take with respect to other fields; positions such as realism, nominalism, conventionalism, naturalism, structuralism, and nihilism. The second part of the volume, containing four essays, focuses on the metaphysics of logic from a historical perspective. Metaphysical issues in the logics of Aristotle, Kilwardby, Hegel, and Bolzano, are discussed, with some emphasis on how these issues relate to contemporary metaphysical debates. The third part of the volume, containing three essays, tackles selected topics in the metaphysics of logic not directly addressed in the previous sections.

What connects almost all of these essays is that they try to answer, in part, the fundamental question of the metaphysics of logic: What grounds the truths of logical consequence? If it’s true that C is a logical consequence of A_1, A_2, \dots , then what is the metaphysical explanation for this truth? The essays offer variations on the following three answers: the structure of the physical world, the structure of our language, and the structure of systems of mathematical objects.

Penelope Rush and Penelope Maddy, in their contributions to the collection, argue that the truths of logical consequence are grounded in some objective structure that the physical world exhibits. Rush argues that there is nothing in principle about the nature of logic that prevents us from having epistemic access to this abstract structure. Maddy argues further that we have reason to believe that the (macro-)structure of the physical world exhibits features that are captured by the principles of classical logic (as opposed to intuitionistic logic, or some many-valued logic).

Both Rush and Maddy propose a realist approach to the philosophy of logic. There is some real, objective, mind-independent structure of the physical world that grounds the truths of logical consequence. An interesting take on this realist view is the idea that logic is grounded, not in the structure of the actual physical world, but in the structure of the collection of the genuinely possible ways the actual world could be. Tuomas Tahko, in his contribution, argues that a sentence is logically true iff it is true in every genuinely possible configuration of the world. Unexpectedly, Tahko claims this view is compatible with a version

of logical pluralism, the view that there are multiple, equally legitimate notions of logical consequence. These are generated by taking subsets of the genuinely possible configurations of the world. The question of whether only certain privileged subsets generate legitimate consequence relations, or whether any subset will do, is unfortunately left unexplored.

An alternative to the view that logic is grounded in the objective structure of the world, takes logic to be grounded in human practices. Mark Steiner's contribution comments on Wittgenstein's view that the truths of logical consequence are explained by regularities in our use of language. He argues that any other view on what grounds logical consequence is a form of, perhaps covert, Platonism. Similarly, Jody Azzouni argues that logical principles are conventional. But this conventionalism with respect to logic does not undermine the view that logical truths accurately reflects the metaphysical structure of the world. Priest considers the relationship between logic and meaning by showing how logic can be rationally revised. According to Priest, if we change our theory of logical consequence, then the use of some of the logical constants may change. And if meaning supervenes on usage, then the meanings of these logical constants may change as well. Bencivenga argues that logic should concern the meanings of a much wider range of terms, not just the logical constants. From his Kantian perspective, Bencivenga employs a transcendental idealism, taking words like "experience" and "representation" as primitive in order to derive the meanings of and logical relationships between words like "object" and "existence". Here metaphysics and logic are very closely linked.

A third approach to the metaphysical ground of logic emphasises logic's importance in the study of formal mathematical systems. Solomon Feferman argues that the logical relationships exhibited by the structure of the natural numbers is best captured by classical logic. However, there are other domains, e.g., the set, S , of all subsets of the natural numbers (or indeed the set of all subsets of S), where intuitionistic logic is more appropriate. The difference lies in the definiteness of the respective conceptions. Our conception of the natural numbers is definite, while our conception of S is indefinite or open-ended. Working with both conceptions together, according to Feferman, requires a semi-intuitionistic logic, where the underlying logic is intuitionistic, but classical logic applies to formulas where the quantifiers range over definite domains.

Feferman's view feels like a version of logical pluralism, as different logics are appropriate depending on the domain under consideration. This kind of pluralism can be generalised to other mathematical structures. Stewart Shapiro takes this view to the extreme, arguing that truth about logical consequence is relative to a mathematical structure or, equivalently, to a mathematical theory. An inference is not simply valid or invalid; it is valid or invalid relative to a mathematical theory (where a theory is a collection of sentences in an object language). Shapiro's view is "extreme" because he admits any non-trivial mathematical theory as legitimate, or worthy of investigation. As long as your theory doesn't make everything true, then the consequence relation of that theory is a legitimate consequence relation. Even inconsistent theories are legitimate, as long as they deploy a paraconsistent consequence relation to avoid triviality. As Shapiro points out, there are many interesting inconsistent theories with fruitful applications in computer science and psychology, thus making them worthy of investigation.

Inconsistencies can play an important role in the metaphysics of logic. If your theory (of the physical world, of a mathematical structure, of the nature of belief, of anything really) involves an inconsistency, then that theory must use a logic that can handle them. In their contribution to the collection, Jc Beall, Michael Hughes, and Ross Vandegrift consider two logical options for theories that involve inconsistencies. One option is appropriate if some of the predicates of your language are essentially inconsistent. The truth predicate may be an example of such an essentially inconsistent predicate. The other option is appropriate for theories containing predicates that are contingently inconsistent. For example, depending on how the laws have been written, the predicate “is legal” may be contingently inconsistent. The logics that Beall, et al., describe are at the extremes of a range of formal systems that can accommodate inconsistent predicates, and there are many options in between. Once we decide on the nature of the things that our theory describes, we can then construct a formal logic to model these things appropriately.

An important question is whether the logician should be concerned with the grounds of logic at all. It may be that there is one special, unique, universal, objective consequence relation out there. Or perhaps, as on the pluralist’s view, there are several. But Curtis Franks argues that progress in logic is obstructed by a search for the formal mathematical structure that matches up with the true notion(s) of consequence. Progress in logic is made by exploring the beautiful relationships between different formal systems of logic. For readers interested in an extremely clear presentation of the fascinating work that professional logicians do, Franks’ contribution is not to be missed. But while the logician need not be concerned with the grounds of logical consequence, the metaphysician should be concerned with these issues, and more.

In addition to establishing the grounds of logical consequence, metaphysics also concerns the kinds of entities that logic presupposes, the objects of logic. The collection addresses these issues from an almost entirely historical perspective. Paul Thom considers whether the objects of logic fit into any of the Aristotelian categories. The answer Thom examines is that of the 13th century English philosopher, and extensive commentator on Aristotle’s logic, Robert Kilwardby. For Kilwardby, the objects of logic are “stateables”. Stateables are mind-dependent things, which exist in speech, in writing, or in thought. But, according to Thom’s Kilwardby, they belong to Aristotle’s categories because they are grounded in natural things.

Kilwardby’s idea of stateables stands in contrast to the more contemporary view that the objects of logic are abstract propositions. Sandra Lapointe’s contribution gives an historical account of this contemporary view, focusing on the logical realism of Bernard Bolzano. For Bolzano, the objects of logic are abstract, mind-independent, “propositions in themselves”. Lapointe argues that Bolzano’s realism is motivated by “internal” grounds: Bolzano commits himself to abstract propositions so that his theory of logic can satisfy certain theoretical *desiderata*. In this case, abstract propositions are useful for defining logical notions such as validity and deducibility.

While Lapointe’s essay focuses on the semantic values of sentences, Gyula Klima’s essay argues that those interested in the metaphysics of logic must consider the semantic values of the components of sentences as well. If our logic is a predicate logic, then we must look at the semantic values of predicate symbols. And once we do that, according to Klima, we are immediately faced with the metaphysical problem of universals: Do universal terms refer

to universal entities, like properties or sets? Klima explores a range of ontological positions that one can take, offering a very interesting look at both ancient and medieval approaches within this range of views. However, the emphasis of this piece is more on the metaphysics of universal terms and less on metaphysical issues in this area that are specific to the philosophy of logic.

The collection provides a stimulating introduction to some of the very many questions that arise once we start to think about the metaphysics of logic. A single volume cannot possibly cover all of the topics in this area, and it is a testament to this collection that one is left wanting more. There is one particularly issue, central to the metaphysics of logic, that the collection as a whole leaves somewhat unexplored: logic's wide, perhaps universal, applicability.

We started by discussing the idea that logic is topic neutral. Logic does not assume the existence of any particular entities because it applies no matter what particular subject matter is under discussion. That logic commits us to absolutely no entities is false. There are objects of logic (stateables, propositions, universals, sets, etc.). The essays in this collection teach us that much. But the wide applicability of logic, to structures and systems of any particular objects, is a topic of worthy consideration in its own right.

Formal systems of logic can be used to represent any system of entities or particulars that you're interested in studying, whether these are physical objects, linguistic objects, mathematical objects, possible worlds, epistemic states, objects in a database, etc. Many of the available formal systems, at least for now, have no known applicability. But many of them apply to features of the world and features of the human mind. And while many essays in this volume grant the applicability of logic to these features, none of them explicitly consider what it is about logic that gives it its wide applicability, and how this applicability is to be explained. It may be that, since formal logics are mathematical objects, logic applies to the world in the same way that mathematics does. Whatever the answer is, it is a question that is of central importance in the study of the metaphysics of logic.

Once we notice, however, that logic has incredibly wide applicability, a worry arises about the whole project of the metaphysics of logic. As this collection shows, the metaphysics of logic is concerned primarily with the metaphysical grounds logical consequence. But for any system of entities you're interested in, you can find a logic to model that system. What grounds logical consequence will depend on what you take to be fundamental to the notion of logical consequence. It may be that what's fundamental to logical consequence, if anything, is the structure of the physical world, or the structure of our language, or the structure of mathematical objects, or all of these. That is a metaphysical question, and one very much worth arguing over. But many of the essays in this volume make an assumption about which structure is fundamental to logical consequence, and then argue as to what is the appropriate logic for that structure. That seems less like the metaphysics of logic and more like the logic of metaphysics.

John Wigglesworth