The Place of Logic in Philosophy

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ABSTRACT

Having drawn the distinction between logic as a discipline and logic as *organon*, this short paper focuses on the latter, the purpose of which is twofold. First, it highlights the importance of second-order logic and modal logic in ontology. To this aim, the role of second-order logic is illustrated in formalizing realist ontology committing to the existence of properties. It is also emphasized how quantified modal logic helps clarify *de re/de dicto* distinction that implicitly takes place in ordinary language. Secondly, the paper concentrates on the significance of modal logic in the philosophy of language. In pursuing this goal, we considered Kripke's notions of *rigid designator, necessary a posteriori* and *contingent a priori statements*. Given the definition of rigid designator, it is possible to prove in quantified modal logic that an identity between proper names, like "Hesperus" and "Phosphorus", if true, is necessarily true. But the truth of the identity statement "Hesperus = Phosphorus" is known *a posteriori*. Therefore, there are *necessary a posteriori* truths. There are also contingent *a priori* true statements like "The length of stick *S* at time t_0 = one meter", as there exists a possible world in which this statement is false.
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From a very broad perspective, logic can be considered in two different ways. First, as a branch of philosophy (like ontology, epistemology, etc.) and second, as the totality of formal tools by means of which philosophical conceptualizations and argumentations are carried out. The latter scrutiny is nothing else but what Aristotle once called *organon.* As such, logic is the only branch of philosophy that is part of the methodology of the rest of the philosophical disciplines. Put in this way, edifying recommendations to the students of (analytic) philosophy should be in line with the wide-ranging classification set out above.

If logic is studied as a discipline on its own, rather than used as a method in various areas of philosophy, it should inevitably be augmented with some knowledge of abstract mathematics

that includes at least set theory. (Of course acquaintance with set-theoretical notions is also indispensable in philosophizing.) As is well known, logic has gone far beyond classical first-order logic with identity (including operation symbols) along with its model theory and meta-logical theorems. The list would include, but not be limited to, second-order logic, conditional logic, many-valued logic, free logic (logic free of existential presupposition), modal logic, epistemic logic, deontic logic, interrogative logic, tense logic, and so on. Of course, someone who wants to specialize in logic needs to acquire deep knowledge of each of these systems. On the other hand, these have wide applications in formulating and solving many philosophical problems, which brings us to the second part of the classification. In the remainder of this short paper, I will focus on the important role of second-order logic and modal logic in ontology and that of the latter in philosophy of language.

To start with ontology, Quine's attitude to second-order logic and quantified modal logic is well known. His nominalism allows only the existence of individual objects and sets of such objects. This is sometimes called "class nominalism" as sets are construed to be individuals. Thus, bound variables of first-order logic will range over individuals and the variables of an axiomatic set theory (with no urelements) over sets. Properties, relations-in-intensions and propositions are disallowed. As such, first-order logic and set theory are the only formal tools suitable for philosophizing. However, there are cases where nominalistic logic has difficulties in explaining. Consider the true sentence "Diligence is a virtue" whose formalization in first-order logic would be "All diligent persons are virtuous persons", which is false as there might be persons who are diligent but not virtuous. (Note that the set-theoretical counterpart would not work either, since the sentence "the class of all diligent persons is a subclass of all virtuous persons" is false.) A formalization of the sentence in second-order logic allowing existence of properties might be: "there is a property F that is identical with 'diligence' that is a member of a class of properties whose other members are 'Patience', 'Temperance', 'Charity', 'Kindness', etc." Now the latter sentence is true. Zalta's *Abstract Objects: An Introduction to Axiomatic Metaphysics* (1983) is a classic that makes use of second-order logic together with modal logic wherein all sorts of abstract objects constituting a realist ontology are introduced. On the other hand, one of Quine's criticisms of quantified modal logic lies in his rejection of metaphysical necessity, or essentialism for that matter, as quantified modal logic gives rise to *de re* modalities. He would, for example, reject that there is an object *x* that is necessarily greater than 7, of course given that quantification is interpreted in the usual objectual sense. However, the contributions of Kripke, Marcus, Putnam, Hintikka and others to quantified modal logic brought back a modern version of essentialism to analytic metaphysics. I will borrow an example given in Chihara's *The Worlds of Possibility* (1998, pp. 24 – 25), one that Plantinga finds in St Thomas' writings. Consider

(1)   Whatever is seen to be sitting is necessarily sitting.

Now it is clear that (1) is true if it is considered to be a *de dicto* modal sentence, since in possible-worlds semantics (1) asserts that

(2)   In every possible world, whatever is seen to be sitting, is sitting.

But (2) is true. However, if (1) is taken to be a *de re* modal sentence it turns out to be false since in possible-worlds semantics it amounts to the false sentence

(3)   Whatever is seen (in the actual world) to be sitting is sitting in every possible world.

Thus a possible-worlds semantics that endorses not only actual objects but also merely possible ones is capable of explaining the difference.

Turning to the philosophy of language, perhaps after Frege's "On *Sinn* and *Bedeutung*" (1892) the most important contribution (to philosophy of language) is Kripke's *Naming and Necessity* (1972) wherein, among others, the notions of *rigid designator*, *necessary a posteriori* and *contingent a priori* statements are presented. Given the definition of "rigid designator", i.e. a linguistic expression is *rigid* just in case it designates the same individual in every possible world it exists, all proper names turn out to be rigid designators. It is then possible to prove in quantified modal logic that an identity statement between two proper names, if true, is necessarily true. For example, since "Hesperus = Phosphorus" is true (as both sides of the identity are proper names referring to the planet Venus), it is necessarily true. Furthermore, since it is known *a posteriori*, we have a case of necessary *a posteriori* truth (Kripke, *ibid.*, pp. 102 -104). On the other hand, consider the sentence "the length of stick *S* at time t_0 = one meter", where the left-hand side of the identity, which is a description, is used to fix the referent of the proper name "one meter". Firstly, since the sentence just serves to fix the reference of "one meter" it is automatically known *a priori.* But, secondly, it is contingent simply because "the length of stick *S* at time t_0" is not rigid as there is a possible world in which the length of stick *S* at time t_0 is not one meter and thus "the length of stick *S* at time t_0 = one meter" turns out to be not necessary, i.e. contingent (Kripke, *ibid.*, pp. 55 -56).

We have seen how modal logic, along with possible-worlds semantics as its model theory, plays a crucial role in explaining new philosophical categories Kripke has introduced in his *Naming and Necessity.* It is very clear that modal logic is a *sine qua non* for analytic ontology and the philosophy of language.

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