Andrea Iacona

Logical Form: Between Logic and Natural Language
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by Giuliano Rosella

Andrea Iacona's book *Logical Form: Between Logic and Natural Language* focuses, as stated in its preface, "on the very idea of logical form". The notion of logical form, Iacona argues (ch. 3.5), has been employed by linguists and philosophers for two primary purposes: (i) the purpose of investigating the semantic structure of natural language sentences, i. e. formulating a compositional theory of meaning aimed at explaining how the meaning of complex sentences can be obtained from the meanings of their constituents; (ii) the purpose of formally explaining the logical relations among sentences (e. g. validity, contradiction). Given this background, the central thesis of the book can be summarized as follows: there is no unique notion of logical form that can successfully serve both (i) and (ii). However, Iacona mainly focuses on (ii) and its relation to the truth-conditional notion of logical form he proposes. Before discussing some of the ideas in the book, it would be convenient to provide a brief outline of its contents.

The first part of the book (ch. 1-2-3) provides the historical background of the idea of logical form: from Aristotle, passing through the Middle Ages and Leibniz's philosophy, to the fathers of the analytic tradition: Frege, Russel, and Wittgenstein (ch. 1-2). In chapter 3, the author argues how the "current conception of logical form" fully develops after Tarski's mathematical treatment of truth and logical consequence. According to Iacona, this conception consists of four claims characterizing the core features of logical form: (1) logical properties, such as validity, inconsistency, etc., depend on logical form; (2) meaning depends on logical form, in that the meaning of a complex sentence *s* can be obtained by the constituents of *s,* in virtue of the logical form of *s*; (3) the logical form of a sentence may not be visible in the surface structure of that sentence; (4) logical form is displayed by a formal language such that "every sentence [in that language] has definite truth-conditions that are determined by its semantics structure and reflected in its syntactic structure" (p. 35). The current conception, as Iacona argues, does not substantially differ from what he calls the "old conception of logical form" that emerges from ch. 2 and 3:

both conceptions share (1) and (3) and agree on the fact that the logical form of a sentence is displayed in some perfect language that is not affected by ambiguity, vagueness, and context sensitivity, unlike natural language. The second part of the book (ch. 4-5-6) contains the central thesis, which can be now reformulated as: no unique notion of logical form can fulfill both point (1) and (2) of the current conception. Iacona starts (ch. 4) by arguing that an intrinsicalist notion of logical form cannot accommodate (1), i. e. it cannot account for the logical properties of sentences. An intrinsicalist notion of logical form entails that the intrinsic properties of *s* itself determine the logical form of a sentence s, that is, properties that are not context-sensitive and hold independently of how *s* is used (syntactic properties, for instance, fall into this category). So, the most natural way to make sense of the intrinsicalist notion, as Iacona suggests (p. 41), is to assume that syntactic properties determine logical form. However, consider an argument, call it A, of the form:

> This is a philosopher
> ————————————
> This is a philosopher

where the first "This" refers to Plato and the second to Donald Trump. According to the intrinsicalist notion, the logical form of the above argument would be displayed, in standard first-order logic, as:

> *Fa*
> ————————————
> *Fa*

As can be noticed, by solely relying on the intrinsic syntactic properties of the sentences involved, it is not possible to exhibit that the two occurrences of "This" in the premise and the conclusion refer to different individuals. Cases like this make it problematic for the intrinsicalist notion to fulfill (1): argument A – in the interpretation considered – should be evaluated as invalid since the premise is true and the conclusion is false, whereas its formalization instantiates a valid argument form. In ch.5, an extrinsicalist notion of logical form is introduced that purports to better account for (1), extrinsicalist in the sense that the logical form a sentence *s* depends now on how *s* is used in a context. The new notion of logical form is based on truth-conditions: the logical form of *s* should mirror the truth-conditions of *s*, where the truth-conditions of *s* may be identified with the content (or proposition) expressed by *s* (p. 54-55). Notice that the content of a sentence is sensitive to the context. For instance, "This is a philosopher", where "This" refers to Plato, has a different content from the same sentence "This is a philosopher" when uttered by pointing to

Donald Trump. Iacona further assumes that the truth-conditional logical form of a sentence s is displayed by a formula α of a formal language when α adequately formalizes s, that is, when α mirrors the truth-conditions of s. From these assumptions, a hyper-intensional notion of logical form emerges, i. e. a notion according to which necessarily equivalent sentences like "it is raining" e "it is raining and either it is snowing or it is not snowing" do not necessarily have the same logical form since they may express different contents. In the following chapters, Iacona shows how this new notion can explain the cases of apparent (in)validities that were problematic for the intrinsicalist notion of logical form (the argument A above turns out to be formally invalid according to the truth-conditional notion). In arguing for his central thesis, he also tries to show (ch. 5.6) that the truth-conditional notion of logical form does not fulfill successfully (2). However, his arguments in favor of this last claim are not developed at length. His main point is that the truth-conditional notion cannot fulfill (2) since the meaning of a sentence s requires some intrinsic properties of s in order to be explained, whereas truth-conditions are extrinsic. However, in principle, this does not exclude that a truth-conditional notion of logical form can account for a compositional theory of meaning as in (2). Marconi, I think, makes this point very clear: " The argument, as it stands, is not immediately convincing. […] [T]ruth conditions may *also* include information that is sufficient for compositional understanding". Hence, he concludes, the thesis that a unique notion of logical form cannot fulfill (1) and (2) "has not been disproved" (Marconi 2020). The last three chapters of the book (7-8-9) explore some applications of the truth-conditional notion of logical form to an account of validity, paradoxes, and some issues concerning quantified sentences.

I now want to focus on some aspects of Iacona's argument in favor of the truth-conditional notion of logical form. I think it is important to mention that there has recently been a deep discussion on Iacona's book and its philosophical implications: several authors (see García-Capintero 2020; Gómez-Torrente 2020; Marconi 2020; Sagi 2020; Sainsbury 2020; Szabó 2020) have presented their objections and comments to some of the ideas developed in the book. Given this background, I will try to focus on two points of Iacona's thesis that do not explicitly emerge from the previously mentioned discussion.

The first point concerns the truth-conditional account and how it is supposed to formally explain a certain kind of arguments. Consider the following:

Pegasus is a winged horse
———————————————
Something is a winged horse

It might be argued, for instance by one sympathizing for free logics (see Iacona 2020), that the above argument is not valid as the premise is true while the conclusion is false: Pegasus is indeed a winged horse although there is no such a thing in reality as a winged horse. Arguments like this are not discussed in Iacona's book: the arguments he considers only involve terms with a (non-empty) reference. If we opt for a first-order language to exhibit the logical form of sentences, as Iacona does, then the above argument would be intuitively formalized as:

$$Fa \wedge Ga$$
$$\overline{}$$
$$\exists x \, Fx \wedge Gx$$

and this is an instantiation of a valid argument schema. Hence, the invalidity of the argument is not preserved in its formalization; namely, the truth-conditional notion would apparently fail in accounting for the logical properties of sentences. Perhaps, Iacona would reply by saying that this discrepancy is not directly implied by the truth-conditional notion of logical form, but it depends on the background logic and vocabulary that one chooses to display the logical form of sentences. Indeed, the choice of the language and the logic may affect the formal validity of the argument. For instance, in the framework of free logic, the above argument would be formally invalid as it instantiates an invalid argument form since the individual constant *a* would have an empty reference. Cases like this help disclose an important implication of Iacona's view: some logical properties, such as validity, depend on the language we choose to exhibit logical form and the logic we stick to select the formally valid argument forms. Szabó has also pointed out this aspect as one problematic feature of Iacona's view: if truth-conditions determine logical form and they are identified with propositions, and if propositions "exist independently of how we represent the world […] Iacona's view entails that the question whether a particular inference is logically valid typically has an objectively correct answer" (Szabó 2020). I agree with Szabó's observation: if logical form depends on propositions and if propositions are out there in the world, then it seems that Iacona's view implies that there is an objectively correct answer to the question of whether an argument is logically valid. I don't have a clear stance on this point, namely on whether there is a correct objective answer to whether an argument is formally valid. However, consider Pegasus' argument: even if we don't know the proposition expressed by "Pegasus is a winged horse", and so we don't know whether it is correct to formalize it within a free logic vocabulary or a first-order one, there might be some choices that are more rational than others, maybe more coherent with our favorite philosophical theory of empty names.

These considerations are connected to the question of *what* makes a certain logic and a specific vocabulary the correct ones to display the logical form and account for the logical properties of sentences. As Sainsbury (2020) highlights, Iacona does not address this question; however, I think, the question is a relevant one when it comes to the logical properties of sentences. Consider, again, Pegasus' argument and suppose we want to explain its invalidity in virtue of its logical form. In that case, first-order language and first-order classical logic that Iacona chooses, as we have seen, won't suffice. Hence, it seems that Iacona's view implies that one should impose some restrictions on the possible choices of logic and logical vocabulary. Some logics and some languages may be better than others when it comes to formally accounting for logical properties. This because, if Szabó's understanding is correct, logical properties of sentences depend on propositions out there in the world, which are independent of how we represent them. This point is not made explicit in Iacona's book: although the author chooses standard first-order logic to display logical form, he seems in principle neutral to the choice of vocabulary and logic. However, this neutrality cannot answer questions like: is there actually such a thing as *the correct* logic to exhibit logical form? And if yes, what is it? Are some logics better than others for the purpose of displaying logical form? I think that these questions are relevant for a notion of logical form to fulfill (2): if logical form is expected to explain logical properties of sentences, then the effectiveness of such explanation essentially depends also on the logic that we choose to exhibit logical form. But these questions remain unanswered in Iacona's book. For example, as we have seen, explaining that Pegasus' argument is not valid in virtue of its logical form requires an adequate *exhibition* of its logical form. Maybe the task boils down to providing a more specific definition of adequate formalization of sentences. Still, the main point remains: for a notion of logical form to fulfill (2), a more accurate account of how it can correctly be exhibited is needed.

The second aspect of Iacona's view I want to focus on is related to the account of validity that he introduces in ch. 7. Validity is distinguished from formal validity, for the former is defined in terms of preservation of truth while the latter in terms of instantiation of valid argument forms. Iacona highlights how, according to his account, "the question of whether validity entails formal validity has no clear answer" (p. 89). For instance, he argues, it is compatible with his account to maintain that the following argument, although being valid, is not formally valid:

The sea is blue
————————————
The sea is not yellow

However, nothing is said about whether it is possible to gain back the formal validity of the above argument. I believe that one way of doing this would be employing the truthmaker theory of propositions. In ch. 5.2, Iacona shows how the characterization of propositions due to truthmaker theory would fit his truth-conditional notion of logical form. The truth-conditional logical form of a sentence s is supposed to mirror the truth-conditions of s, i.. e. the proposition expressed by s. Suppose the proposition expressed by s is identified with the set of truthmakers of s, i. e. facts in the world that are responsible for the truth of s. Then, the argument above could be reduced to a case of formally valid argument in virtue of synonymity of sentences (as in the case of the argument at p. 65). The sentences C: "The sea is blue and it is not yellow" and D: "The sea is blue" may be regarded as synonymous in virtue of them expressing the same proposition, where expressing the same proposition may be understood as having the same truthmakers. For instance, C and D would express the same proposition since a truthmaker of C would also count as a truthmaker of D, and vice versa. Indeed, assume, for the sake of argument, that the sea instantiating the property of being blue is a truthmaker of "the sea is blue". This fact is intuitively also a truthmaker of "the sea is not yellow", since instantiating the property of being blue prevents the sea from being yellow. Hence the above argument could be formalized as

$$Ba \wedge \neg Ya$$
$$\overline{}$$
$$\neg Ya$$

which is a valid form. This move, I think, represents only a possible advantage that the truth-conditional notion of logical form may take by being tied to a more specific characterization of propositions. The truthmaker theory, for instance, could account for valid arguments which are intuitively tricky to be represented as valid forms. It would be interesting, I think, to see the further implications of the truth-conditional notion when combined with the truthmaker theory.

In conclusion, Iacona's book is very enjoyable reading and develops some ideas about logical form, which are also in line with some recent developments in formal semantics (for instance, the hyper-intensional truth-conditional notion of logical form seems to match well with the hyper-intensional conception of propositions within truthmaker semantics). It would also be interesting to see whether and how some aspects of the truth-conditional notion of logical

form may be developed further. In particular, whether the truth-conditional notion implies some preferences on the logical framework employed in the formalization and whether sticking to a characterization of propositions in terms of truthmaker semantics may influence the explanation of logical properties in virtue of logical forms.

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