sciendo

Introduction

Diego Marconi
University of Turin

DOI: 10.2478/disp-2020-0009 BIBLID [0873-626X (2020) 58; pp.199–208]

Abstract
This introduction is a short critical presentation of the topic and main arguments of Andrea Iacona's book *Logical Form*. Furthermore, it summarizes the commentators' views on two central issues: Iacona's rejection of the uniqueness thesis, i.e. his claim that no single notion of logical form can be adequate to the tasks that logical form has been supposed to perform, and the relation between a sentence's logical form and its truth conditions.

Keywords
Logical form, natural language semantics, semantic interpretation, syntactic structure, truth conditions.

The notion of logical form has been widely used in both linguistics and the philosophy of language of the last century; indeed, it is often regarded as a central notion of both disciplines. However, the notion has been put to somewhat different uses, and few philosophers or linguists have taken the trouble to properly define it. In philosophy, its introduction is usually attributed to Russell and Wittgenstein's *Tractatus*, with Frege laying the ground by highlighting some linguistic phenomena that are taken to motivate it; but, as Mark Sainsbury shows in his contribution to the discussion that follows, the real history is pretty intricate, and classical texts that are often supposed to be seminal presentations of the notion (such as Russell's "On Denoting") do not in fact use it, or not explicitly. In (Chomskyan) linguistics, logical form has always been supposed to govern semantic interpretation (here understood as comprehension), hence to fix (*inter alia*) quantificational structure; however, its connection with determination of a sentence's truth conditions has been more adumbrated than clarified. It seems that the notion of logical form has been more often appealed to (perhaps with different pre-

suppositions) than explicitly theorized. Andrea Iacona's recent book *Logical Form* addresses the issue of whether a single notion of logical form can be defined that could play (what he takes to be) the several roles that have been attributed to it. As we shall see, his conclusion is negative: there are two, irreducibly distinct notions of logical form, each suitable for a different role.

Iacona starts by reconstructing the origins of the notion in the work of Frege, Russell, and the early Wittgenstein. He then argues that the contemporary notion "does not substantially differ" from the one that had emerged from the founding fathers' reflections (p. 36)—he calls it "the old conception". He characterizes the contemporary notion by the following four principles, which may be read as requirements on an adequate notion of logical form:

(1) Logical properties depend on logical form

(2) Meaning depends on logical form

(3) Logical form may not be visible in surface structure

(4) Logical form is exhibited in a logically perfect* language

Some clarifications may be useful. By 'logical properties' Iacona means properties such as inconsistency and validity (which others might call 'semantic' rather than 'logical'). By 'surface structure' he means grammatical structure as determined by syntactic analysis (and represented e.g. by a labeled graph). The notion of a logically perfect* language is an evolution of the "old" notion of a logically perfect language, according to which a language L is logically perfect if and only if the truth conditions of every sentence of L "are determined by its semantic structure and reflected in its syntactic structure" (p. 22). The new notion of logical perfection* differs from the old by requiring that truth conditions be so determined *in every model* (as, in the new conception, L is regarded as uninterpreted). The word 'reflected', in Iacona's use, indicates coincidence of syntax and semantics in the following sense: for every syntactic category, e.g. Common Count Noun [CCN], there is a semantic category that contains exactly the expressions that belong to CCN, and conversely. This differs from a more common characterization of "reflection"

in terms of rules, on which it is required that for each syntactic *rule* there be a semantic rule that applies to the semantic values of expressions of the syntactic types of the expressions that the syntactic rule applies to (as, paradigmatically, in Montague's "Proper Treatment of Quantification in Ordinary English", 1973); however, both characterizations appear to be equivalent given a few reasonable assumptions.

Historically, says Iacona, logical form had been supposed to play two main, distinct theoretical roles. On the one hand, as per (1) above, it was supposed to explain logical properties of sentences (and logical relations among sentences): a sentence had such properties and relations *in virtue of* its logical form (p. 37), hence, they could be explained from it. On the other hand (as per (2)), logical form was supposed to account for the structure of a sentence's meaning. Sentential meaning was conceived as a function of its constituents' meanings (this was Frege's compositionality assumption); logical form specified, in each case, which function computed sentential meaning from which constituent meanings (in other words, it specified both the function and the semantic types of its arguments). Iacona calls the first theoretical role "the logical role", the second "the semantic role". It was standardly assumed that logical form could, and did, play both roles (*Uniqueness Thesis*, UT). The central claim of Iacona's book is that the uniqueness thesis is false: no notion of logical form can play both the logical and the semantic role.

Iacona's argument for the falsity of UT develops as follows. First of all, it is argued that logical form cannot be a property a sentence possesses independently of its context of use, i.e. it cannot be an *intrinsic* property of sentences. One reason is that there are inferences which may or may not be logically valid depending on the context in which they are carried out. E.g., the following inference:

This is a philosopher

———

This is a philosopher

is valid if both occurrences of 'this' refer to the same individual, invalid otherwise. Hence, there is a logical property of the first sentence—entailing the second sentence—which is not independent of

context. Consequently, validity of the inference (when it *is* valid) cannot be determined by logical form, if logical form is intrinsic to a sentence; for, by definition, intrinsic logical forms are indifferent to the context of use. But logical forms, in their logical role, were supposed to explain logical properties such as validity of inferences; hence, if logical forms are to play a logical role, they cannot be intrinsic. More examples to the same effect are produced. If we call 'content' the semantic value of an expression relative to a context of use, the general conclusion is that logical properties are determined by content, not by "semantic structure" alone (p. 53).

A sentence's content is identified with its truth conditions; not, however, in the sense in which the truth conditions of 'This is a philosopher' are expressed by the statement that that sentence is true if and only if the demonstrated object has the property of being a philosopher. Iacona understands truth conditions as material conditions, involving referents of expressions, not just conditions on their reference (such as "being the object that is demonstrated in context *c*"). Coherently, this extends beyond context-dependent expressions such as demonstratives, e.g. to proper names: 'Hesperus is a planet' and 'Phosphorus is a planet' are said to have the same content/truth conditions, so that the inference

Hesperus is a planet

———

Phosphorus is a planet

is regarded as formally valid; in the same vein, the logical form of 'Hesperus is Phosphorus' is '$a=a$' (pp. 78–9). Of course, Iacona hastens to admit that a linguistically competent speaker may lack the empirical knowledge that is required to *know* that 'Hesperus is Phosphorus' has logical form '$a=a$' (p. 80), or that the above inference is formally valid (p. 79). Thus, even though 'Hesperus is Phosphorus' and 'Hesperus is Hesperus' have the same logical form (i.e. '$a=a$'), the obvious epistemic difference between the two sentences is not lost: in the former, but not in the latter case knowledge of logical form requires empirical knowledge (p. 80). It follows that, given Iacona's notion of truth conditions, linguistic competence (including semantic competence) does *not* amount to knowledge of truth conditions.

If Iacona's argument goes through, it shows that no intrinsic notion of logical form can play the logical role, i.e. explain a sentence's logical properties and relations. For the logical role, we need an *extrinsic* notion, such as form as determined by truth conditions in Iacona's "material" understanding of them. This does not amount to showing that the Uniqueness Thesis is false, for it might be that some extrinsic notion—perhaps Iacona's own notion—can play the semantic role as well, thereby validating UT.

This issue is first addressed in §5.6. There, Iacona argues as follows: (1) the semantic role requires that logical form is appealed to in a compositional theory of meaning, but (2) sentential meaning is intrinsic (i.e., determined by syntax and the conventional, non-contextual semantic values of the constituents); hence, (3) meaning cannot be explained in terms of truth conditions, as these are not intrinsic properties of sentences. This argument, as it stands, is not immediately convincing. Iacona's material truth conditions are extrinsic in that they include information that is not provided by either syntactic structure or conventional linguistic meanings of constituents. However, that does not rule out that truth conditions may *also* include information that is sufficient for compositional understanding. Indeed, material truth conditions appear to contain all information, both lexical semantic and syntactic, that is needed to determine sentential meaning (hence, in the tradition of philosophical semantics, knowledge of sentential meaning was often identified with knowledge of truth conditions). That, in Iacona's view, for logical form to play the semantic role *less* information is needed than is provided by truth conditions does not, in itself, show that logical forms that are adequate to the logical role cannot play the semantic role as well. Hence, so far UT has not been disproved.

The issue of the inadequacy of truth conditions to the semantic role is taken up again in Ch. 8. There, Iacona argues that, if the logical form of 'All philosophers are rich' is expressed by '$\forall x(Px \rightarrow Qx)$' (as in the Fregean tradition), then logical form does not mirror the original sentence's syntactic structure; hence, assuming that logical form in its semantic role determines sentential meaning *on the basis of syntactic structure*, the Fregean logical form cannot play the semantic role. This is a more powerful objection against UT. However, it remains to be shown that playing the logical role *requires* syntactic

structures that are foreign to ordinary linguistic competence; or, contrapositively, that ordinary syntactic competence, while adequate to the semantic role, is inadequate to the logical role. More generally, to reach a decision about UT we need a fuller conception of the semantic role, a notion that is somewhat underdeveloped in Iacona's book.

The discussion that follows is rich in both themes and arguments. Here, we shall only anticipate the discussants' views on two crucial points: the uniqueness thesis (UT) and the relation between logical form and truth conditions in Iacona's "material" sense (is '$a=a$' the logical form of 'Hesperus is Phosphorus'?).

1 The uniqueness thesis

Among commentators, Manuel García-Carpintero and Zoltán Szabó defend UT. Gil Sagi argues, like Iacona, that there are two notions of logical form, though she characterizes the logical notion differently. Mark Sainsbury acknowledges that Iacona's two notions correspond to two distinct tasks that have been attributed to logical form, except that—he argues—logical form cannot perform either task. Finally, Mario Gómez-Torrente does not address the uniqueness issue directly, as he is mostly concerned with rejecting Iacona's characterization of logical form in terms of truth conditions.

García-Carpintero (who is perhaps the closest to Iacona's view) agrees that in determining logical forms we must go beyond "the narrowly syntactic criterion", on which (*inter alia*) "only ortographic shape matters" to logical form. In his view, what we formalize, i.e., what we take as relevant to logical form, is *what we understand,* e.g., coreference as fixed by anaphoric relations. But he fails to see how this threatens UT. We do need a distinction between non-contextual, conventional meaning ("semantic content") and contextually determined meaning ("assertoric content"), and we should grant that logical properties such as validity depend on the latter, not on the former; however, assertoric contents "crucially depend on semantic contents", which supports "some sort of unicity". García-Carpintero seems to be unimpressed by Iacona's remarks to the effect that the structure of logical forms as determined by truth conditions may not mirror syntactic structures, on which the semantic role of logical

form is supposed to be based (as Szabó points out in his comment).

Szabó also defends UT, but he moves from flatly rejecting Iacona's connection of logical form with truth conditions: he holds that "sentences… have logical forms in virtue of broadly structural features: syntax, indexing, and the meanings of logical constituents". The need to include indexing entails that logical form is not fully compositional: for communicative intentions, which determine both coreference and lack of it for both demonstratives and proper names, are neither constituents nor syntactic features of sentences. This doesn't threaten UT: both sentential meaning and logical properties are determined by semantic composition *and* communicative intentions. However, 'logical' should be taken as variable: according to Szabó, that a necessary entailment is regarded as logical may depend on whether certain expressions ('true', 'must', 'before', etc.) are taken to express logical concepts.

Like Iacona, Sagi countenances two notions of logical form (so she also rejects UT). However, unlike Iacona, she brings them back to two distinct disciplinary projects, serving different aims: there is a linguistic notion (essentially coinciding with Iacona's semantic notion), to be used in the description of natural languages, and there is a philosophical notion, intended to "provide a tool for reasoning in science". While the former notion—that characterizes the analytical work of Montague, Davidson, and ("arguably") Chomsky—is descriptive, the latter, exemplified by Frege's *Begriffsschrift* and therefore labelled the "traditional" notion, has normative aspects. Both the linguistic and the traditional program make use of formal tools, but whereas in the linguistic program they are used to model linguistic phenomena, in the traditional program they are used to "revise and ideally replace" natural language. For Iacona, logical form in its logical role pertains "to objective notions of content and of truth conditions, that are there to be discovered and described". By contrast, Sagi sees (traditionally-minded) formalization as "a form of explication", which aims at improving on natural language.

Sainsbury agrees that logical forms *have been taken to* play Iacona's two roles, the logical and the semantic; however, he does not address the uniqueness issue, for he holds that logical forms can play *neither* role. E.g., the logical form of a sentence is supposed to exhibit the sentence's logical properties and relations; but this can be

the case only on the assumption that "the natural language originals have … been replaced by truth conditional equivalents in the formal language"; i.e., in order to work out the formal paraphrase we must already know—by understanding the original sentence—which properties the paraphrase is supposed to make salient. In general: "If logical forms have the same semantic and logical features as what they are supposedly forms of, why don't natural language sentences count as their own logical forms? If logical forms differ in their logical and semantic features from what they are supposedly logical forms of, how can they throw light on the semantics and logic of their targets?". The traditional answer is, as Sainsbury well knows (cfr. pp. 228–9), that natural language is often misleading ("Language disguises the thought", *Tractatus* 4.002): logical forms make perspicuous the *real* logical import and semantic structure of natural sentences, as distinct from their *seeming* import and structure. Nevertheless, the objection stands: if logical forms just spell out the theorist's independent understanding of the original sentences, why isn't such understanding enough? The only role Sainsbury countenances for (something like) logical forms is as empirical, psychological hypotheses about the *processing* of natural language sentences by a speaker/hearer, as in Kamp and Reyle's Discourse Representation Theory.

2 Logical form, truth conditions, and coreferential names

Given that Hesperus is identical with Phosphorus and that most believe that the identity is necessary, is the logical form of 'Hesperus is Phosphorus' (in its logical role) '*a*=*a*', as Iacona claims it is (p. 79)? Is the argument from 'Hesperus is a star' to 'Phosphorus is a star' to come out *logically* valid (p. 78)? All commentators reject these claims; thus, it appears that they thereby reject Iacona's view that logical form, in its logical capacity, is determined by truth conditions as he understands them (i.e., as "material" truth conditions).

This is clearly stated by both Szabó and Gómez-Torrente. "The most important difference between Iacona's view and mine—Szabó says—is that he thinks sentences have logical forms in virtue of their truth-conditions, while I hold that sentences (or, rather, discourses) have logical forms in virtue of broadly structural features". In the same vein, according to Gómez-Torrente "an appropriate

understanding of the 'logical' notion of logical form will not match a characterization made in terms of the notion of truth conditions". Indeed, for Gómez-Torrente it would be wrong-headed to attribute logical forms to sentences based on their truth conditions, for we understand the former notion better than the latter: our intuitions about two sentences sharing the same logical form are more definite and stable than our intuitions concerning their having the same truth conditions. E.g., in cases such as

> 'The liquid in John's glass is water' / 'The liquid in John's glass is H_2O'

it can be argued both that the two sentences have the same truth conditions and that they don't; but—Gómez-Torrente says—it is clear that they *don't* have the same logical form.

Even García-Carpintero, though the closest to Iacona's views among the commentators, disagrees about the logical form of 'Hesperus is Phosphorus'. His argument is that only *de iure* coreference, such as coreference that is determined by anaphoric relations, is relevant to logical form; and that, again, is because formalization applies to *what is understood* in context, not to relations such as *de facto* coreference (as with 'Hesperus' and 'Phosphorus') that a fully competent speaker may be unaware of. Hence (e.g.), the correct formalization of 'If Hesperus equals Phosphorus, then it is visible in the morning' is '$a{=}b{\rightarrow}P(a)$'—not '$a{=}a{\rightarrow}P(a)$'—because 'it' anaphorically corefers with 'Hesperus' (not with 'Phosphorus'), whereas coreference of 'Hesperus' and 'Phosphorus' is not forced by understanding in context.

Sagi also disagrees, but her argument is different. It can be reconstructed as follows. Suppose an analyst ignores that Hesperus is the same as Phosphorus, so she formalizes 'Hesperus is Phosphorus' as '$a{=}b$'. According to Iacona, that would be wrong: that's not the sentence's *real* logical form, as it does not mirror its truth conditions. But, on Sagi's conception, there is no such thing as a sentence's "real" logical form that the analyst is supposed to discover: "Logical form ... is always accessible to the reasoner carrying out the formalization—indeed, it is imposed by the formalization"; a formalization assigned by a reasoner may be inadequate in some respects, "but ... not due to its failure to capture a pre-existing logical form unknown

to the reasoner". Hence, from Sagi's viewpoint, Iacona's view would amount to imposing a meta-constraint on formalizations, on which two names that denote the same object *must* be assigned the same symbol. But imposing such a constraint would be "requir[ing] [from the analyst] knowledge that goes beyond what may be expected of a competent speaker of a language". This is regarded by Sagi as an "odd result": apparently, in her view (like in García-Carpintero's), formalization should reflect ordinary competence.

Finally, Sainsbury raises a number of objections against regarding logical form—in its logical capacity—as determined by Iacona's "material" truth conditions. That would entail that logical forms cannot be known a priori, which, in turn, would have dire consequences: logic would turn out not be an a priori discipline; no sentence whose logical form is '$a=b$' would have cognitive value; ancient astronomers would turn out to have been logically, as well as astronomically ignorant; and more. Perhaps, Sainsbury's central point can be put as follows: by collapsing the distinction between formal and non-formal validity, Iacona's view takes formality out of logical form. If playing the logical role is identified with accounting for validity in general, then no notion of logical *form* can account for it: Iacona's "extrinsic" notion, which does account for validity in general, is not really a notion of logical *form*. Notice, however, that in his response to Sainsbury Iacona denies that his view just eliminates the distinction between formal and non-formal validity.

Diego Marconi
University of Turin