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# LOGICAL FORM: SYNTAX AND SEMANTICS*

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## 1. *The Intuitive Adequacy of Accounts of Logical Consequence*

It is clear to readers of Wittgenstein's *Tractatus* familiar with its author's intellectual development that one of the work's main concerns lies in providing a philosophically accurate explication of logical validity. Wittgenstein expresses his dissatisfaction with what his philosophical mentors, Frege and Russell, had said on the topic both in the work itself and in his earlier correspondence and writings. Besides, there are good reasons to think that Wittgenstein only came to accept an almost too obviously flawed semantic theory of language and thought like the Picture Theory (including the claim that most interesting truths cannot be said but only shown) because he thought that the theory allowed an intuitively satisfactory account of logical validity, improving on the proposals by Frege and Russell. One of these reasons is to be found in the first one hundred and few paragraphs in the *Logical Investigations*, read as providing a diagnosis of the philosophical confusions that led to the mistakes in its author's previous work, which he thought was the only alternative worth considering to the views in the *Investigations*. Now, we can read in § 89 that the discussion so far "bring us up to the problem: In what sense

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is logic something sublime", an ironical allusion to the Tractarian view; and this "problem" is later said to find expression "in questions as to the *essence* of language" (§ 91), described with the Tractarian viewpoint in sight as "the great question that lies behind all these considerations" (§ 65). Last but not least, Wittgenstein counts as his "fundamental idea" (*Grundgedanke*) in the *Tractatus* "that the 'logical constants' are not representatives; that there can be no representatives of the *logic* of facts" (4.0312), a rather mysterious declaration of which the only clear thing is that it is related to the views on logical validity advanced later in the work.

Now, contemporarily we have come to regard the model-theoretic explication of logical validity given originally by Tarski (1936) a few years after the *Tractatus*, in contrast to other technically precise notions with an intuitive counterpart, as one whose adequacy is seldom doubted. In a background set theory a class of models is characterized, and a relation of satisfaction between models and sentences is defined. *X* is said to be a *logical consequence* of *K* if every model that satisfies every member of *K* also satisfies *X*. In the article where Tarski first stated this notion (henceforth, "T-validity"), he already claimed intuitive adequacy for his proposal. In opening the paper, Tarski declares: "The concept of *logical consequence* is one of those whose introduction into the field of strict formal investigation was not a matter of arbitrary decision on the part of this or that investigator; in defining this concept, efforts were made to adhere to the common usage of the language of everyday life" (*op. cit.*, 409). And after proposing the model-theoretic explication, he goes on to contend: "It seems to me that everyone who understands the content of the above definition must admit that it agrees quite well with common usage" (*ibid.*, 417).

Tarski's strategy to justify his claim of intuitive adequacy for T-validity is analogous to the one he had previously followed, in his celebrated work on truth, to establish the intuitive adequacy he also claimed in that work for his explication of the truth-concept for a given language L. His idea was to highlight a trait that is an essential distinctive feature of the ordinary concept of truth as restricted to the relevant language L, namely, satisfaction of his famous schema T; and then to show that his *definiens* also possesses that feature.





Following this strategy, in the case of the intuitive concept of logical validity ("i-validity" henceforth) Tarski (1936) highlights the following features as guiding the applications of the explicated intuitive concept:

> Consider any class *K* of sentences and a sentence *X* which follows from the sentences of this class. From an intuitive standpoint it can never happen that both the class *K* consists only of true sentences and the sentence *X* is false. Moreover, since we are concerned here with the concept of logical, i.e. *formal*, consequence, and thus with a relation which is to be uniquely determined by the form of the sentences between which it holds, this relation cannot be influenced in any way by empirical knowledge, and in particular by knowledge of the objects to which the sentence *X* or the sentences of the class *K* refer. The consequence relation cannot be affected by replacing the designations of the objects referred to in these sentences by the designations of any other objects (*op. cit.*, 414-415).

To an unprejudiced eye, Tarski is here stating something with which most logicians before and after him, certainly including the author of the *Tractatus*, would have been in agreement. Namely, that i-validity (remember, intuitive *logical* consequence) has two distinguishing traits in addition to the trait it shares with any other form of consequence, *truth-preservation*: either the conclusion is true, or some premise is false. Firstly, an i-valid argument is *formally* truth-preserving (the *formality criterion*, henceforth): any argument of the same form is also i-valid, and therefore truth-preserving. Secondly, an i-valid argument is *necessarily* truth-preserving (the *modality criterion* henceforth): the conclusion is true not only with respect to the actual world if the premises are all true with respect to it, but it is also true with respect to every possible circumstance with respect to which the premises are also all true; in particular, every epistemically possible circumstances left open when empirical knowledge is not considered.

Consistent with this strategy, after introducing T-validity as his explication, Tarski contends that it satisfies the requirement:

> It seems to me that everyone who understands the content of the above definition must admit that it agrees quite well with common usage. This becomes still clearer from its various consequences. In particular, it can be proved, on the basis of this definition, that every consequence of true sentences must be true, and also that the consequence relation which holds between given sentences is completely independent of the sense of the extra-logical constants which occur in these sentences. (*op. cit.*, 417)

In a much-discussed book, Etchemendy (1990) has argued that T-validity does not really meet the demands that Tarski appears to impose on any adequate explication of i-validity, that is, those that he appears to claim for it in the text above. Etchemendy focuses on the modality criterion, disregarding the formality criterion. Some of Etchemendy's critics – to whom I will generically refer as "the Quinean" – have replied to him, in defence of the adequacy of T-validity, that there is no need for an adequate concept of validity to satisfy the modality criterion. Some of them have added a historical twist to this line of reply, arguing that, properly understood, Tarski in fact did not impose the modal requirement on the above passages. The Quinean, however, accepts the other criterion, formality, and contends that T-validity satisfies it. My label for him has been chosen on the basis of the obvious affinities between the concerns of these writers and Quine's philosophical views on these matters, his general rejection of modal notions as scientifically ungrounded, and his appeal to substitutivity, obviously related to the formality criterion, in his own account of logical validity. The Quinean, I should say, is not a straw man, as an examination of the critical literature generated by Etchemendy's work would show. Such an examination, however, would take us too far afield, forcing us to carefully interpret the nuances of different views; and in any case I do not have space for it[1].

The main goal of this paper is to elaborate on some aspects of a previous reply to Etchemendy's criticism that I made some time ago (García-Carpintero, 1993), suggesting that, much as Tarski himself appears to indicate in the quoted texts, satisfaction of the formality and modality criteria go hand in hand, against what the Quinean wants. More specifically, I will argue here that there is a crucial ambiguity when the formality criterion is mentioned, which the Quinean trades on and Etchemendy ignores. There are what I will describe as

[1] For the sake of giving credit where credit is due, however, I will mention some writings that I count as Quinean, among other things because I have learnt much from them: Gómez Torrente 1996, 1998, 1998/9, 2000a (but Gómez Torrente 2000b is not Quinean at all), Hart 1991, Jané 1997, Ray 1996. Among non-Quinean critics of Etchemendy with whom this paper is essentially in agreement, I would like to mention Hanson 1997, Macià 2000, Pérez Otero 2001, Sagüillo 1997, Shapiro 1998, Sher 1996.





a *syntactic* and a *semantic* understanding of formality. The Quinean views invoke the syntactic one; I will argue, however, that there is no reason to believe that formality, under that interpretation, provides an adequacy criterion for explications of i-validity. On the other hand, meeting the formality criterion understood under the semantic interpretation makes it plausible that the modality criterion is also satisfied.

While pursuing this main goal, I will make some remarks on the Tractarian views on logical validity, comparing them to those of the main contenders in the dispute I will be addressing, and trying to provide some elucidation and discussion of Wittgenstein's *Tractatus Grundgedanke* – the view that logical constants are not representatives.

## 2. *Formalization and the Formality Criterion*

I will distinguish two conceptions of formality. The formality criterion has been characterized earlier as follows: if an argument is i-valid, any other argument of the same form is also i-valid, and therefore also truth-preserving. Our question now is, what is it for two arguments to share (logical) form? I will indicate that there are two different answers, relying respectively on a *syntactic* and a *semantic* view of logical form, and I will argue that only the latter should be mentioned in a criterion for the intuitive adequacy of explications of logical validity.

In order to introduce the distinction, I will invoke two illustrative examples so as to hopefully make vivid the more theoretical characterization. Before proceeding, however, I must raise a crucial issue that should be addressed the moment the question of the intuitive adequacy of the model-theoretic explication of logical validity is discussed, but few writers in fact tackle; Etchemendy certainly does not[2]. The issue is, how can the relationship between i-validity and T-validity be discussed at all, when, directly at least, those concepts are applied in non-overlapping domains? The concept of i-validity applies to inferences or arguments that are primarily a type of speech-

[2] See, however, Blanchette 2000 and Macià 2000.

act made with sentences of natural languages (henceforth, n-languages and n-arguments), and secondarily to corresponding mental acts; while the concept of T-validity is directly used to discriminate between arguments consisting of formulas, and classes thereof, in languages introduced *ad hoc* by logicians (henceforth l-languages and l-arguments). Obviously, if the issue of intuitive adequacy can be raised at all, some non-arbitrary relationship between n-languages and l-languages should be assumed. There is a name for this relationship, *formalization*, but little in the way of explication. The very minimum that is required of that relation is that some formulas of l-languages, but not others, correctly formalize given sentences of n-languages.

Two points are clear about correct formalizations. Firstly, the relation is many-to-many; the same formula of an l-language can correctly formalize more than one sentence of an n-language, and more than one l-language formula can correctly formalize the same n-language sentence. The second point concerns any appropriate extensional criterion of adequacy for explications of logical validity. Whatever a properly stated extensional criterion requires, the second clear point about the formalization relation is that the criterion cannot require the T-validity of every l-argument that correctly formalizes a given i-valid n-argument. Consider, for instance, the following argument:

(1) $3^2 = 9$
if $9 = 3^2$ then $3^2 = 9$,
hence
$9 = 3^2$".[3]

Now, (1) is an i-valid argument with an irrelevant second premise. The following, though, is a correct propositional formalization of the preceding argument:

(2) $p$
$q \rightarrow p$
$\therefore q$

(2), however, is an invalid l-argument. The extensional adequacy of the Tarskian explication is guaranteed nonetheless, to the extent

[3] I owe this example to José Miguel Sagüillo.





that there is another correct T-valid formalization, the following first-order T-valid l-argument (also one with an irrelevant second premise):

(3) $a = b$
$b = a \rightarrow a = b$
$\therefore b = a$

For the extensional adequacy of the Tarskian explication, thus, the most that can be required is that some correct formalization of a given i-valid argument be T-valid. When this is the case, the n-argument counts also, indirectly, as T-valid.

Aside from these two generally acknowledged points, little is explicitly discussed concerning the nature of correct formalizations. Our two different conceptions of formality, the syntactic and the semantic, are in fact different conceptions of what a correct formalization is. As indicated, I will introduce the distinction by means of two examples.

## 3. *First Example: Anaphoric Relations and Their Expression*

Consider the English sentence (4):

(4) 9 equals itself

Is the following formula

(5) a = a

a correct first-order formalization of (4)? If so, (4) should count as T-valid, for there would then be a correct formalization of it in first-order logic with identity that is T-valid. This looks like an intuitively acceptable result; however, under the syntactic interpretation of the formality criterion, the most natural answer is negative.

We conclude this from the main tenets of the syntactic interpretation, which are as follows. We assume the notion of a *syntactic feature* of the expressions of a given language L. An important syntactic feature of this kind is *being a grammatical sentence* of L; other syntactic features include all properties of expressions on which the grammaticality of L's sentences might depend. Among them, the features identifying L's lexical units, and the sort of order relations between

units and phrases usually represented by means of labelled trees. Now, it is a syntactic feature of (5) that it includes expressions of the same type at two different syntactic positions in the sentence's structure. In that respect, it differs from (6):

(6) a = b

(6), on the other hand, would count as a correct formalization of, say, (7) below, which is not i-valid, and (correctly) is not counted as T-valid either, because a correct formalization like (6) is not T-valid, and there does not appear to exist any alternative correct T-valid one:

(7) 9 equals $3^2$.

To avoid potential confusions we will emphasize at this point that it is *logical* validity *in the strictest sense* (i.e., as Tarski says, *formal* validity) that we are discussing here. It is not what we may call *analytical* validity, logical validity in an extended sense – the sense in which "Brutus killed Caesar, therefore Caesar died" is logically valid. Frege and others, including the author of the *Tractatus*, thought that this can be explained in terms of logical validity in the narrow sense, plus definitions; Frege also thought, famously, that (7) is logically valid in this extended sense. We nowadays have good reasons to reject both claims, that analytical validity can be reduced to logical validity plus definitions in the way Frege thought, and that (7) is analytically valid in that sense. Be that as it may, the important point for present purposes is that (7) is not logically valid in the sense we are trying to characterize.

Going back to the status of (4) given the syntactic conception of form, prima facie at least, (6) appears to provide its correct formalization; because the syntactically relevant features of (4) are those that it shares with (7), namely, it features expressions of different types occupying the subject-and object-positions of the verb "equals". Thus, according to the syntactic interpretation, (4) does not share logical form with the arguments correctly formalized by (5), and therefore should not count as logically valid in that regard.

Things are different from the semantic viewpoint. The semantic point of view does not focus primarily on mere syntactic matters, but on certain features of meaning – and on syntactic matters only to the extent that they convey those features. I will use the term-of-art "pro-





position" for the logically relevant aspects of the meanings of n-languages sentences. Ideally, I should put as little as possible of a philosophically controversial nature on what I take propositions to be, given that for the sake of space and focus we will not be able to justify controversial claims here. However, a presentation of the semantic viewpoint sufficiently abstract to be ideally noncommittal would be difficult to follow. Thus, I will present the semantic view of form assuming dogmatically any required controversial semantic views that I believe correct. There are alternative but equally semantic conceptions of form. I rely on a particular one to make intelligible my main claim, namely, that only a semantic conception of form, as opposed to a purely syntactic one, should figure in a criterion of adequacy for explications of logical validity.

I take propositions to be structured, their structures corresponding to the way in which the meanings of n-languages sentences are compositionally determined. This allows us to speak of the constituents of a given proposition. Some of those constituents are (maximally) topic-neutral; these are Frege's *logical objects*, the meanings of the logical expressions. There are different attempts at clarifying and making precise the vague notion of topic-neutrality. Some are of little use. Thus, Sainsbury (1991, 313) says: "the logical constants are topic-neutral: they can be distinguished by the fact that they introduce no special subject-matter. Thus 'if' and 'some' are intuitively not 'about' anything at all, whereas a name like 'Ronald Reagan' is about Reagan, and 'happy' is about 'happiness'". As far as I can see, however, as much as "Reagan" is about Reagan and "happiness" about happiness, "if" is about the material conditional relation between certain semantic features of sentences, their truth-values; and "some" is about the binary relation obtaining between classes with a non-empty intersection.

Other attempts are more successful, among them Tarski's (1966) own in terms of insensitivity to permutations of the domain, or a related one developed by Sher (1991). It is assumed for these accounts that n-arguments concern specific domains of objects. A permutation $f$ on a given domain induces a relation in the class of potential semantic values of the expressions in a given n-argument; if the semantic value of a referential expression is an object $a$, its related value will be $f(a)$, if it is a subclass of the domain it will be the class including $f(a)$ for

any *a* in the original class, and so on. Consider now the proposition *p* expressed by a given sentence S; if we take instead S to express a proposition obtained by substituting for the extensions of some of the constituents of *p* their images in the induced relation, it is clear that in some cases S's truth-value might change. Topic-neutral constituents are those for which this would not be the case.

I share with Hanson (1997, 390-395) some misgivings concerning the full adequacy of Tarski's and Sher's accounts. The main problem lies in their purely extensional character, which makes their compatibility with the apriority of logical validity problematic[4]. This problem would vanish if we completed this view with what I take to be the correct view about our understanding of the logical expressions (including not only the usual first-order "logical constants", but also the ones we will be discussing soon). It is a view that has been elaborated and defended by Hacking (1979) and Peacocke (1987), among others. As the latter writer puts it, understanding logical expressions is a matter of finding "primitively compelling in virtue of their form" inferences acceptably formalized by rules like the introduction and elimination rules in certain natural deduction systems. The view is not, of course, that any kind of psychological compulsion like the one described can be taken to constitute a possession-condition for a genuine logical notion. Such a claim would fail for reasons that Prior (1960) convincingly deployed against previous versions with a conventionalist slant of this sort of view. Only rules for which a semantics can be provided that would make them genuinely truth-preserving in virtue of their form are acceptable. Different semantics to this effect can be ascribed to the logical expressions, but I am assuming here that the correct one assigns to them the sort of topic-neutral denotation that their counterparts in first-order logic have.

Topic-neutral constituents are propositional constituents, and thus meanings that, like others, can be signified by means of different expressive resources. Under the semantic view of logical form, this is what (5) and (4) illustrate. The topic-neutral constituent at stake is

[4] Although I agree with Sher's views on most points in these issues, I find her reply to this kind of criticism unsatisfactory. See Sher 2001, 256.





the relation such that a given constituent in a structured proposition is the same as another. This topic-neutral propositional constituent is expressed in (5) by using expressions of the same type in two different syntactical positions. In (4) it is not signified by this expressive resource, but by another common in n-languages, although lacking in l-languages; namely, by using an anaphoric expression in a given syntactical relation to another, its antecedent[5]. For purposes of formalization, under this semantic interpretation of the task, this difference in expressive resources is irrelevant. What matters is the semantic commonality, namely, that the signified topic-neutral constituent is the same.

These are then, relative to our first example, the two views of formalization and identity in logical form. According to the syntactic conception, a correct formalization captures purely syntactic features of the formalized n-arguments, and arguments share the logical form captured by a given formalization to the extent that they share the relevant syntactical traits. In the semantic conception, a correct formalization represents primarily topic-neutral propositional constituents; it represents syntactic features only to the extent that they signify those constituents. Arguments share logical form if they share those semantic features.

There is an obvious objection to the defence of the semantic view implicit in what has been said so far. Let us go back to the example. There are differences in syntactic features between (4) and (7). In view of this, the defender of the syntactic conception might propose to count (5) as, after all, the proper formalization of (4), at first sight without abandoning his main tenets. He might say that the placing of a reflexive pronoun in a certain syntactic relation relative to a name should be formalized exactly as the placing of same-type names in that relation. This is still a purely syntactic way of classifying forms, which does not mention alleged semantic facts concerning topic-neutral propositional constituents.

This objection is well taken, but it will be more convenient to address it after discussing a second example in the next section. At

[5] I have discussed the formalization of sentences like (4) in García - Carpintero 1998, in connection with Kaplan's argument that token-reflexive accounts of indexicals violate the formality of logic.

this point, and without in any way intending to suggest that this properly deals with the objection, let me just make it clear that the example has been chosen because it is sufficiently vivid to introduce the discussion of the point I want to make, but can be unduly misleading on matters related to the objection. What is misleading in the example is the election of a reflexive pronoun as our anaphoric expression. There are strict linguistic constraints requiring that reflexives like "itself" in (4) be interpreted as anaphoric relative to "9". However, in order to present the semantic conception of logical form we could have chosen other examples. Consider, for instance, (8):

(8) If 9 equals $3^2$, then it is not a prime number.

There is no linguistic requirement that "it" in (8) be interpreted as anaphoric with respect to "9". It is rather a pragmatic matter whether, in a given utterance, it should be understood that way, or rather as referring to other, contextually specified object. Still, if the former is the case, given the semantic conception of logical form there is no question but that (9) is a correct first-order formalization of (8):

(9) $a = b \rightarrow \neg P(a)$

The reason is that in the semantic conception, what we formalize is a topic-neutral constituent of what is understood, independently of the means (syntactic, pragmatic or whatever) via which that understanding occurs. Still, as I said this does not properly address the objection, because its main point is still in order: it does not seems to contradict the main tenets of the syntactic conception to take (9) as the proper formalization of (8), when the pronoun is understood as anaphoric with respect to "9"; for the two occurrences of "a" in (9) still correspond to a syntactic trait of (8), the occurrence of "it" in a certain syntactic relationship with respect to the occurrence of "9".

## 4. *Second Example: Neutral Relations*

In a recent paper, Kit Fine (2000) convincingly questions a common assumption about the ontology of relations; his views will serve to set the stage for the second example. The issue that Fine raises concerns relations of any number of arguments, but for the sake of





simplicity I will consider only binary relations. The common assumption questioned by Fine is that relations hold of objects in specific orders. Under this conception, for every relation there is another one, its converse, which at least in the case of non-symmetric relations is distinct. This, however, is ontologically dubious. For consider true propositions about two blocks, *a* and *b*, involving a relation and its non-symmetrical converse, *that a is on top of b* and *that b is beneath a*. Because the truth-conditions they codify are satisfied, there are corresponding truth-makers in the actual world, state of affairs $s_1$ and state of affairs $s_2$[6]. Now, ontological good sense appears to dictate that $s_1 = s_2$. However, under the assumption that relations hold of objects in a given order we are forced to reject this; at least if we also maintain, as seems reasonable, that the same state of affairs cannot result from (as it were) saturating two *distinct* relations with the same objects.

To concur with ontological good sense, a different conception of relations as *unbiased* is required, according to which it is not the case that relations hold of objects in specific orders; this would allow for "*x* being on top of *y*" and "*x* being beneath *y*" (in general, an expression for a relation and another for its converse, symmetrical or non-symmetrical) to signify the same unbiased relation. Under such a view, we still must of course be able to distinguish the propositions expressed by, say, "a is on top of b" and "b is on top of a". The view that I favour (which differs from the one Fine himself in the end subscribes, as will transpire later) holds that, when relations are signified (at least when non-symmetrical relations are signified) we also signify different kinds of *positions* or *roles* that objects might play in order to saturate them; the latter are, I guess, a reification of the "thematic roles" discussed by linguists. Thus, we contend that both "*x* being on top of *y*" and "*x* being beneath *y*" signify the same unbiased relation, *vertical placement*, a relation that comes with two roles, *top* and *bottom*. We also contend that, in signifying a proposition involving this relation, some means of expression is adopted so as to indicate which object plays which role. In English, being the subject of "is on top of" signifies the role *top*, while being the argument of

[6] Concerning truth-makers, see Mulligan *et al.*, 1984 and Armstrong 1997.

the preposition "of" signifies the role *bottom*; the opposite is true of "is beneath".

After thus setting the stage, let us look at the second example. There is a class of natural languages known as *ergative languages*, of which Basque is one. Linguists oppose them to *accusative languages* like English, Spanish or Latin[7]. Consider NP-subjects of a transitive verb in accusative languages, like "the woman" in a sentence like (10):

(10) The woman saw the man.

Those NP share certain syntactic features with the NP-subjects of intransitive verbs, like "the woman" in "the woman came", which distinguish them from NP-objects like "the man" in sentences like (10). For instance, they agree with the verb, and they share morphological features: nominative case, in Latin, as opposed to accusative case for the NP-object; in English, the fact that, if those NPs are replaced by pronouns, it is forms like "he"/"she", as opposed to "him"/"her" for the NP-object, that take their place. Let us use "nominative case" for the full range of those syntactic features. Now, according to the view on relations outlined in the previous paragraph, some expressive resources in sentences like (10) should indicate which objects occupy the relevant positions or thematic roles of the relation. In accusative languages, the nominative case signifies that the object denoted by the NP plays paradigm thematic roles such as the experiencing agent in the present example (10); while (what we might call) *accusative case* signifies different paradigm thematic roles such as *theme*.

In ergative languages, on the other hand, matters are syntactically very different. As in accusative languages, one of the NP in transitive sentences shares some syntactic features with the NP in intransitive sentences; but what that NP signifies does not play the thematic role signified by the subject of sentences like (10) in accusative languages, but rather the thematic role signified by the NP-object in those sentences; these NPs are in a case known as "absolutive". The other NP in translations of transitive sentences like (10) is in a case known as "ergative"; it is NPs in this case that signify that the objects they

[7] I owe very helpful information and discussion to Itziar Laka.





denote play thematic roles such as that of the experiencing agent in the previous example. (11) illustrates the point:

| | | |
|---|---|---|
| (11) Emakume-a-k | gizon-a | ikusi zuen |
| woman-the-erg man-the | saw (V + aux). | |
| (12) Emakume-a | ibili zen | |
| woman-the | walked (V + aux). | |

Consider then a transitive sentence like (10) in an accusative language, and a synonymous one in an ergative language like (11)[8]. Should we formalize both of them by means of, say, the first-order formula (12)?

(12) R(a, b).

Given the semantic conception of logical form and formalization, the answer is unproblematically positive. What matters from the semantic point of view is the representation of topic-neutral constituents of propositions. In accusative languages, the nominative case of an NP in a transitive sentence like (10) signifies a topic-neutral constituent, namely, that the object denoted by the NP plays one of a certain set of salient thematic roles: agent, experiencing agent etc (the particular thematic role is selected by the specific transitive verb in the sentence). In ergative languages, this same topic-neutral prepositional constituent is signified instead by the ergative case. Such a set of syntactic features is not present in accusative languages, but from the semantic viewpoint this is neither here nor there for purposes of formalization. Conventionally, the topic-neutral meaning signified in English by nominative case is signified in first-order logic by placing a given constant in the first position when signifying that a binary relation holds among two objects, and that signified by the accusative case by placing the constant in second position. Hence, (12) is an adequate formalization both of (10) and (11), with "a" standing for the woman and "b" for the man.

It is at least not immediately clear that we can get the same result in the syntactic conception; for, as we have seen, from a strictly speaking syntactic point of view there are no obvious correspondences bet-

[8] For further examples and discussion, see Laka 1996 and 2002.

ween transitive sentences and accusative languages and their translations in ergative languages.

## 5. *The Argument for the Semantic Conception of Logical Form*

This concludes the initial presentation, by means of the examples, of the distinction between the syntactic and the semantic conception of logical form and formalization. We can now take up the objection raised at the end of the third section. The defender of the syntactic conception appears to be able to disregard the simplistic formalization criteria that we have saddled on him in discussing the preceding examples, in favour of more complex but still purely syntactic criteria that will produce the desired results. In doing so, he could say, he will in no way be departing from the goals for which we resort to formalization. When formalizing, we create a model as scientists do when they characterize "frictionless worlds"; we abstract away from what we take to be distracting features of real-life situations so as to highlight those that according to the theories at stake are explanatorily relevant. Thus, for instance, l-languages have a single negation operator with a simple syntax, in contrast to the appalling syntactic complication of n-language negation. The two relatively simple devices proper of l-languages considered in the previous examples (respectively, the placing of expressions of the same type in certain syntactic positions, and the placing of constants in a given order) have analogous functions: they represent in a simple way much more complicated linguistic resources, but what they represent are still purely syntactic features.

This reply is well taken, as far as it goes; it does not go far enough, as we are about to see, but it helps us to make clear what the real disagreement is between the syntactic and the semantic conception of form. Semantics supervenes on syntax; differences in semantic features between expressions require differences in the medium through which they are expressed. (It may be thought that context-dependent expressions falsify this, but they do not; context-dependency only shows that the expressions with the relevant semantic features are not just the types, but the types taken together with contextual factors, perhaps the tokens instantiating them). Therefore, the reply we have illustrated





relative to our two examples will always be available to the defender of a syntactic view of form.

The real issue confronting the syntactic and semantic conceptions is one of explanatory adequacy. According to the semantic conception, the explanation of formalization provided by his opponent is correct, but it is not final. There still remains a meaningful question: why are all those syntactically variegated resources classified together, as instances of one and the same logical form? For the defender of the syntactic conception, this is not a legitimate question: the classification is explanatorily final. For the defender of the semantic view, it is legitimate, and the answer, of course, is that the variegated resources have in common that they are resources for the signification of common semantic features. The argument in favour of the semantic view is that it is explanatorily more satisfactory: the question it raises is legitimate, and the answer it suggests illuminating[9].

Let us see why this is so. For present purposes, n-arguments are a type of speech act; we do not need to worry about their mental counterparts to make the point, although the point would stand if we did so. Like other speech acts, inferences are governed by norms. Thus, aiming at truth is undoubtedly involved in the specific norm governing assertion, even if the specific norm is, say, conveying knowledge[10]. By the same token, aiming at truth-preservation is involved in the specific norm governing inference in general, logical, analytical, inductive, common-sensical or whatever. The formality criterion for the intuitive adequacy of explications of logical validity states that, if an argument is logically valid, any argument with the same form is truth preserving. The semantic conception of form provides an explanation of why this is so. We have not given a detailed explanation, but we have said enough to see that one is forthcoming. Arguments sharing logical form are truth preserving because to share logical form is to share propositional constituents, the sort of features that deter-

[9] As van Fraassen 1980, 23-40 makes clear, demands for explanation are not always justified. My point against the Quinean is that they are justified in this case, for reasons to be given. I thank Mauricio Suárez for raising this issue.

[10] See Williamson 1996.

mine the truth conditions of sentences and the conditions for the preservation of truth from premises to conclusion.

On the other hand, the refusal to countenance the request for explanation that ultimately characterizes the syntactic conception is not satisfactory. Semantics supervenes on syntax, but syntax is independent or autonomous from semantics. The accounts of the autonomy of syntax are usually confused, as a result of which it has been questioned on the basis of inadequate considerations. Properly understood, the autonomy of syntax is not challenged by the point that, in general, syntactic features serve semantic functions. For the autonomy of syntax lies in the fact that many *specific* syntactic features that are involved in determining which sentences are well formed in a given language cannot be explained by ascribing them semantic functions. Two lexical units of different types might perform the same semantic function in two different languages; if we replace one by the other in a grammatical sentence, however, grammaticality is lost. The same applies to more interesting syntactical devices. The combination of ergative and absolutive case in a translation of (10) into Basque is a device with the same semantic function as the combination of nominative and accusative case in (10); but the attempt to use the first device in accusative languages will give rise to ungrammaticality. The autonomy of syntax consist then in that many specific syntactic features distinguishing a particular language are semantically unmotivated; specific syntactic features might well lack any semantic function at all.

This being so, a proposal which identifies logical forms in terms of classes of specific syntactic features cannot be the last word when it comes to invoking such a notion of form in a criterion for the intuitive adequacy of explications of logical validity. The reason is that, so far, the proposal lacks an account of why arguments that share logical form preserve truth; but such an account is needed, because there is no direct entailment of semantic features like truth-preservation by syntactical features. This is, in summary, the argument for the semantic conception of form[11].

[11] In using a merely syntactic conception of form, the Quinean reminds us of Quine's 1986 well-known substitutional definition of logical validity; as I indicated earlier, this is the rationale behind my label for him. Correspondingly, the sort of objection I level against the Quinean in the main text is reminiscent of analogous objections to Quine's views, made by Etchemendy 1990, 164-165, n. 13, 167, n. 6, among others.





I have defended a semantic interpretation of the formality criterion. Does T-validity satisfy it? A salient feature of T-validity is a distinction between expressions with fixed meanings, and expressions whose meanings differ from model to model. By means of this distinction, T-validity captures the formality criterion, the way I have claimed it should be understood. In other words, the expressions with fixed meanings in the l-languages used for specific applications of the model-theoretic account capture, in the streamlined way proper of an abstract scientific model, the topic-neutral meanings in which we are interested. What is the relevance of this for the satisfaction of the modality criterion?

As we saw, Tarski (1936) seems to suggest in a text quoted earlier that the satisfaction of the formality criterion suffices also for the satisfaction of the modality criterion: "since we are concerned here with the concept of logical, i.e. *formal*, consequence, and thus with a relation which is to be uniquely determined by the form of the sentences between which it holds, this relation cannot be influenced in any way by empirical knowledge". Tarski also assumes here that the modality that matters when i-validity is at stake has an epistemic character. Although I cannot develop the point here, I think that this insight of Tarski's is correct, and that following it we can dispose of Etchemendy's criticisms[12]. In a nutshell, the suggestion is that i-validity is to be explicated as a particular case of analyticity. In general, analytic truth (or truth-preservation) is truth (or truth-preservation) in virtue of the meanings of some terms, and i-validity in particular is truth-preservation in virtue of topic-neutral meanings. The "in virtue of" in the above claim is primarily ontological; it is the claim that analytic truths are constitutively determined by meanings[13]. But it has also an epistemic dimension; to the extent that analytic truths can be known,

[12] So far, I have developed the point only in a Spanish publication, "La adecuación del análisis modelista de consecuencia lógica", *Agora*, 2001.

[13] Boghossian 1997 questions the very intelligibility of the analytical explication of apriority, understood in ontological terms (as opposed to merely epistemological terms). I do not think his arguments are compelling, for reasons I develop in a so far unpublished paper co-authored with my colleague Manuel Pérez-Otero, "The Conventional and the Analytic".

they can be known as a result of knowing the meanings of certain terms, and are therefore a priori.

## 6. *Are there Primitive Logical Objects?*

I will conclude by discussing a different line of reply to the above argument that writers sympathetic to the Quinean viewpoint may yet pursue. This reformed Quinean line would grant our request for a semantic explanation of adequate formalization, and allow that one along the lines previously outlined should be provided. It will be suggested, however, that the topic-neutral propositional constituents appealed to in the semantic conception are not "deep", or "substantive". They are but shadows, "response-dependent" projections of the variegated syntactic devices signifying them, perhaps a form of fictional entity. At the very least, they differ in a crucial respect from paradigm meanings of non-logical expressions. While the latter are objective entities, whose natures are independent of the representational devices that signify them, the former are not.

This is how I propose to interpret the Tractarian *Grundgedanke*. The conception of logical validity defended in the *Tractatus* is clearly semantic, non-Quinean to that extent: "If all the truth-grounds that are common to a number of propositions are at the same time truth-grounds of a certain proposition, then we say that the truth of that proposition follows from the truth of the others" (5.11). There is a model-theoretic view of sorts implicit here. The *Tractatus* appreciates the capacity of languages like those devised by Frege and Russell to make logical form perspicuous (3.325), but insists that logical relations obtain only among sentences of interpreted languages (6.124). An interpretation is called in the *Tractatus* an "application of logic" (5.557), given through empirical experience by meaning-assignments to the lexical units constituting elementary sentences, the Tractarian "names" (5.55). An application of logic thus determines the "truth-grounds" for classes of sentences mentioned in the Tractarian definition of logical validity just quoted (5.11), the set of possible worlds relative to which all sentences in the class are true. Logical validity thus presupposes an application or other, although it is independent





of any particular application; in this sense, logical validity connects with experience (5.552).

Thus, given the Tractarian view of logical form, if an argument is logically valid, the conclusion is true in all possible worlds in which the premises are; but the same obtains also relative to the different classes of possible worlds that would be determined by different applications of logic, i.e., different interpretations of the lexical units. Adapting an idea of David Lewis (1979), we could consider "centered possible worlds" instead of plain possible worlds, taking the names as a substitute for a subject to constitute the centre. (This is not far away from the Tractarian viewpoint either; a Tractarian subject is after all a class of interpreted names, 5.5421). For any possible world, we could consider different ways of assigning objects in that world to the names; each way would constitute a centered possible world. Hence, the Tractarian view is that the conclusion of a logically valid argument is true relative to all centered possible worlds in which all its premises are true. In my view, this is also what T-validity comes to; this is why both views satisfy the modality criterion[14].

The Tractarian view of logical form is therefore clearly semantic, like the one I have been defending here, and this is shown in that it has the proper modal implications. When Wittgenstein says in stating his *Grundgedanke* that the logical constants are not representatives, he is not saying that they are mere syntactic devices with no meaning at all or that identity of logical form should simply be understood as identity in abstract syntactic features. Logical expressions, including the less obvious ones that served for our two previous examples – those expressing anaphoric relations and positions of objects standing in neutral relations – signify formal properties and relations (4.122), and hence are formal concepts (4.126). What is then the thought behind the claim that they are not representatives, that formal objects cannot be proper propositional constituents?

My answer to this was suggested above. The satisfaction of formal properties and relations is a necessary fact known *a priori* (4.123).

[14] I develop this point in "Modality and Logical Consequence", a companion piece to this paper, and in the Spanish publication mentioned in the last footnote but one.

The *Tractatus* attempts to account for this on the basis of the Picture Theory. In the Tractarian terminology, the different ways that we considered in our two previous examples to signify, respectively, anaphoric relations and positions in neutral relations are different *signs* that share the same *symbol* (3.32). A symbol is a formal property, an abstract feature shared by expression belonging to different languages with otherwise very different specific syntactic features *and* by their meanings (3.344). One can thus in general recognize that formal properties are satisfied, and in particular that relations of logical validity obtain, "from the symbol alone" (6.113). Nevertheless, given the obvious inadequacies of the Picture Theory, we do not need to care here about its qualities as an explication. We only need to keep in mind what Wittgenstein tried to account by means of it, namely, the apriority and necessity of (some) facts concerning formal objects.

According to the interpretation I propose, the *Tractatus* concludes that the formal entities known in knowing *a priori* these facts whose non-existence is inconceivable have a different ontological status than the names' referents. I invoked before the terminology of truth-makers, deriving from the *Tractatus*[15]. Language is fundamentally referential in that true utterances are made true by truth-makers, constituted by language-independent objects. The point of the Tractarian *Grundgedanke* would then be that formal entities are not real constituents of truth-makers; and this ontological point is supported with epistemological considerations – that we know a priori facts about them; that their not obtaining is inconceivable; that they are presuppositions of every intentional act, whose being taken for granted is shown in carrying it out; that they are to that extent necessary. Under this interpretation, the Tractarian claim that logic is transcendental (6.13) would be truly Kantian, as this is usually understood: an ontologically dubious claim (about, say, the mind-dependent character of space and time) derived from epistemological considerations concerning the indispensability of space and time for intentional acts.

Be what it may of this interpretation of the Tractarian *Grundgedanke*, a similar view appears to be taken by Fine (2000). I said earlier

[15] See Mulligan *et al.*, 1984.





that he rejects the "positionalist" account (as he labels it) of the ontology of relations that I assumed. One of the two reasons that he provides is that the account does not work for constitutively symmetrical relations (*being adjacent to*); for if different positions were also signified in this case, it would not be necessary that they apply to $<a, b>$ if and only if they apply to $<b, a>$. This criticism is not compelling; for the positionalist could say that these are relations constitutively without (differential) thematic roles. It is not a strict (formal) logical truth that if $a$ is adjacent to $b$, then $b$ is adjacent to $a$, but it does not need to be; it is enough that it is an analytic truth. The objection to positionalism that matters most to Fine is an ontological one, reminiscent I think of the worry that sustains the view I have ascribed to Wittgenstein: "there is nothing objectionable about reference to argument-places as such ... But we are strongly inclined to think that there should be an account of the identity of argument-places in other terms and that there should be an account of the relational facts, of the pattern of exemplification, in which all reference to argument-places is eschewed" (Fine, *o cit*, 16).

Fine develops an alternative "antipositionalist" account of the topic-neutral thematic roles. Given the ontological worry that motivates it, Fine's proposal appears to be a particular case, for the specific logical objects posited by the positionalist account, of the one I have suggested for the general case on behalf of the reformed Quinean. The aim is to provide a non-substantive reductive explication of thematic roles in ontologically parsimonious terms. Given that Fine wants relations to be unbiased, he cannot simply take away the thematic roles, or positions, because then his account would disastrously fail to distinguish between the truth-makers of, say, "$a$ is on top of $b$" and "$b$ is on top of $a$". He appeals instead to different "manners" that a given unbiased relation can be "saturated" or "completed", so as to give rise to a relational fact. The difference between the truth-makers for "$a$ is on top of $b$" and "$b$ is on top of $a$" lies in that the very same relation is completed in different manners. "Since *co-mannered completion* is an equivalence relation, it will give rise to corresponding abstracts, the manners of completion [...] The resulting antipositionalist view is, of course, committed to manners of completion. But the ontology is not objectionable in the way that the ontology

of the positionalist was. For *he* was obliged to treat positions as basic objects, of which no explanation in other terms could be given [...] but the antipositionalist can treat manners of completion as derivative objects, as the products of abstraction" (Fine 2000, 23-4).

The obvious objection is that, so far, this is not an alternative to the positionalist view; for the positionalist will explain that two relational complexes result from completing a given relation with two pairs of objects in the same manner if, and only if, the designated objects occupy the same positions. For the antipositionalist, ontologically deflationary view to be a real alternative, it should *both* take the relation *co-mannered completion* as primitive, and establish that this is still ontologically deflationary. The prospects of this project appear rather doubtful. Fine concurs: "I agree that *co-mannered completion* is not the sort of notion that should be taken as a primitive. But [...] I suggest that we should define it [...] in terms of the notion of substitution. For to say that $s$ is a completion of a relation $R$ by $a_1, a_2, \ldots, a_m$, in the same manner that $t$ is a completion of $R$ by $b_1, b_2, \ldots, b_m$ is simply to say that $s$ is a completion of $R$ by $a_1, a_2, \ldots, a_m$ that results from simultaneously substituting $a_1, a_2, \ldots, a_m$ for $b_1, b_2, \ldots, b_m$ in $t$ (and vice versa)" (*ibid.*, 25-26). However, I do not think that this advances matters in any substantive way for the ontologically deflationary view. Once again, the positionalist will not disagree with Fine's substitutional account; but he has a structural explanation for it: that a relational fact can be obtained by substitution from another and vice versa consists in that the two facts share structural features, to wit, a certain neutral relation together with given positions. For the ontological deflationary view to be a real alternative, it should once more *both* take substitution as primitive, and establish that this is compatible with its ontologically deflationary stance. Once again, I cannot see any reason to grant this.

More in general, I find Fine's antipositionalism flawed for reasons that can be stated in the following way. The positionalist posits logical objects – argument-places or thematic roles – as constituents of the truth-makers of some relational truths. The antipositionalist suggests that this is acceptable, to the extent that we think of those logical objects in a way reminiscent of how secondary properties are conceived of vis-à-vis primary properties. While the latter are fully objective, mind-and language-independent constituents of the actual





world whose independent existence we must assume if we want to provide a sensible account of thought and language, the former are not. Now, we should not have any objection to secondary properties. On the assumption that some of the properties of which we think and speak are primary, a clear account can be provided of secondary properties, and there are reasons to think that some such properties are actually instantiated.

However, primary properties are assumed in any clear-headed account of any such projections, shadows or fictions as secondary ones are claimed to be. In my view, the existence of some logical objects must be assumed ultimately for similar reasons. Nobody seem to have any idea of how to provide an account of truth-makers that does not assume at least negative truth-makers in addition to positive ones, and general truth-makers in addition to particular ones[16]. The *Tractatus*' failures in these regards have been frequently discussed. The same applies to the features of truth-makers discussed in my previous examples: the relation of being occupied by the same object among structural positions, and categorical features distinguishing properties from objects, positions in relational truth-makers, and so on. This is why the reformed Quinean, deflationary strategy should also be rejected. It is ultimately on the basis of indispensability considerations, of the kind that Quine and Putnam have made compellingly for Platonism about mathematical entities, that a similar view should be adopted concerning logical objects.

The core of what I have argued for in this paper can be put as a conditional: to the extent that one feels compelled to adopt a realist-externalist view on the semantics of expressions like natural kind terms (perhaps for the sort of consideration advanced by Kripke and Putnam, and/or for considerations favouring scientific realism), then one should adopt a similar view regarding logical expressions. In addition, I have set apart two alternative views on logical expressions and logical form, the syntactic one defended by the Quinean and the semantic but deflationary ascribed to the reformed Quinean, and I have proposed to interpret the Tractarian *Grundgedanke* as advancing the latter.

[16] See, for illustration, the discussion of these matters by Armstrong 1997.