Two Notions of Logical Form

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This paper claims that there is no such thing as the correct answer to the question of what is logical form: two significantly different notions of logical form are needed to fulfil two major theoretical roles that pertain respectively to logic and semantics. The first part of the paper outlines the thesis that a unique notion of logical form fulfils both roles, and argues that the alleged best candidate for making it true is unsuited for one of the two roles. The second part spells out a considerably different notion which is free from that problem, although it does not fit the other role. As it will be suggested, each of the two notions suits at most one role, so the uniqueness thesis is ungrounded[1].

1 The uniqueness thesis

There are two fundamental questions that are mostly left unsettled by the current uses of the term 'logical form'. The first concerns the individuation of logical form. If a sentence s is correctly described as having a logical form f, there must be some fact in virtue of which s has f, that is, some fact which constitutes the ground for the ascription of f to s. So it may be asked what kind of fact is it. In other words, the question is what is it for s to have f.

The relevance of this question becomes clear if one thinks that different kinds of properties can be ascribed to s: syntactic structure, linguistic meaning, content expressed, and so on. Some of them are *intrinsic* properties of s, in that they are invariant properties that s possesses independently of how it is used in this or that context, while others are *extrinsic* properties of

[1]This paper is the result of a series of elaborations of Iacona [?], from which it takes sections ?? and ??. Its contents have been presented at the University of Turin (2014) and at the University of Parma (2014), where I received helpful questions and objections. I would like to thank Andrea Bianchi, Diego Marconi, and one anonymous referee for their written comments on previous versions of the text.

s, in that they may depend on how s is used in this or that context. Therefore, one way to address the question of individuation is to ask whether the logical form of s is determined by intrinsic properties of s, or instead it is determined by extrinsic properties of s.

The second question concerns the theoretical role of logical form. If f is ascribed to s, it is because it is assumed that the ascription of f to s can feature as part of a theory which is able to explain some facts. So it may be asked what kind of theory is it, and what kind of facts is it able to explain. In other words, the question is what is the point of ascribing f to s.

In the analytic tradition, initiated by Frege, Russell and Wittgenstein, two major theoretical roles have been regarded as constitutive of logical form. One is the *logical role*, which concerns the formal explanation of logical relations, such as entailment or contradiction. In this case it is assumed that a logical relation is formally explained if its obtaining or not in a given case is deduced from some formal principle that applies to that case in virtue of the logical form of the sentences involved. The other is the *semantic role*, which concerns the formulation of a compositional account of meaning. Here the assumption is that a semantic theory for a natural language must explain how the meaning of a sentence can be obtained by composition from the meanings of its constituent expressions in virtue of its logical form.

This paper suggests that the first question crucially depends on the second, in that different theoretical roles require different criteria of individuation. More precisely, its goal is to challenge a widely accepted thesis which may be called the *uniqueness thesis*:

(UT) There is a unique notion of logical form which fulfils both the logical role and the semantic role

(UT) is a very general thesis, in that it does not say anything specific on the notion that is taken to fulfil the two roles mentioned. Nonetheless it is a substantive thesis, at least in the obvious sense that its negation is consistent with some widely accepted claims about logical form. In particular, two claims directly connected to the logical role and the semantic role deserve consideration:

(C1) The logical properties of a sentence depend on its logical form

(C2) The meaning of a sentence depends on its logical form

In order for each of these two claims to be true, it must be true in virtue of some notion of logical form. But this is consistent with there being no single notion of logical form which makes them both true, or with there being more than one such notion. Here the focus will be on the existence condition, so the second possibility will not be considered.

We saw that the question of individuation admits two kinds of answers: either logical form is determined by intrinsic properties of sentences, or it is determined by extrinsic properties of sentences. Therefore, if (UT) is true, either it is true in virtue of some *intrinsicalist* notion of logical form, that is, some notion based on a criterion of the first kind, or it is true in virtue of some *extrinsicalist* notion of logical form, that is, some notion based on a criterion of the second kind.

Of course, this is not to say that whoever endorses (UT) has a definite position on the question of individuation. Even though it is likely that Frege, Russell and Wittgenstein endorsed (UT), no definite position on that question can rightfully be ascribed to them. Yet the question is there, whether we answer it or not. To see its relevance, it suffices to think about context sensitive sentences, which provide a clear illustration of the contrast between intrinsic and extrinsic properties. Consider the following sentence:

(1) I like ice cream

Either one thinks that the logical form of (1) is determined by intrinsic properties of (1), which are context insensitive, or one thinks that it is determined by extrinsic properties of (1), which are context sensitive. In the first case one gets that the formal representation of (1) does not vary from context to context, while in the second one gets that the formal representation of (1) does vary from context to context. The difference between these two options cannot be ignored. Frege, Russell and Wittgenstein did not provide clear indications in this sense simply because they never engaged in a thorough investigation of the relation between logical form and context sensitivity.

In what follows, (UT) will be questioned on the basis of considerations concerning the formalization of context sensitive sentences. The case against (UT) will be built by drawing attention to some points about formalization and context sensitivity that seems independently justified. None of these points, taken individually, is new or original. Indeed, they are mostly well known. The interest of the material that will be presented lies rather in the way these points are spelled out and brought together.

2 Intrinsicalism

The view of logical form that is commonly taken to substantiate (UT) may be called *intrinsicalism*, because it is the view that logical form is determined by intrinsic properties of sentences:

(I) There is a unique intrinsicalist notion of logical form which fulfils both the logical role and the semantic role.

Obviously, (I) entails (UT). Instead, (UT) does not entail (I), since it does not say anything specific on the individuation of logical form. The use of the term 'determined' - here and in what follows - is loose to some extent. To say that logical form is determined by a property of a certain kind is to say that the ascription of logical form to a sentence is grounded on the fact that the sentence has a property of that kind. This does not entail that two sentences have the same logical form if and only if they have exactly the same property of that kind. Determination is not to be understood in terms of necessary and sufficient conditions.

A natural way to make sense of (I) is to assume that the intrinsic properties involved in the determination of logical form are syntactic properties. In this case the view is that logical form is determined by syntactic structure, where syntactic structure is understood as "real" structure, as distinct from surface structure. Accordingly, (UT) is taken to be true in virtue of what may be called the *syntactic notion* of logical form. The syntactic notion of logical form is obviously an intrinsicalist notion of logical form.

Note that, if syntactic structure is understood as real structure, as distinct from surface structure, there is no one-to-one correspondence between sentences and syntactic structures. For ambiguous sentences are described as surface structures that can be associated which different real structures. However, ambiguity may be ignored for the present purposes. In what follows we will restrict attention to nonambiguous sentences, so the claim that will be considered is that the logical form of s is determined by the real structure of s.

The first clear advocacy of the view that logical form is determined by syntactic structure is due to Montague. According to Montague, the formal translation of a sentence, which is derivable from the real structure of the sentence, serves two purposes at the same time. On the one hand, it features as part of a compositional theory of meaning for a fragment of the language to which the sentence belongs. On the other, it explains the logical relations between the sentences of the fragment. As a matter of fact, Montague does not distinguish between these two purposes, as he claims that the basic aim of semantics is to characterize the notions of truth and entailment[2].

After Montague, the view that logical form is determined by syntactic structure has been taken for granted by all those who have adopted his formal approach to natural language. One important elaboration of this view concerns indexicals and demonstratives. As Lewis and Kaplan have shown, a sentence which contains indexicals or demonstratives can formally be described as a sentence that has truth conditions relative to parameters called "indices" or "contexts", that is, parameters which provide appropriate semantic values for the indexicals or demonstratives occurring in the sentence. In the case of (1), for example, a suitable parameter is taken to provide a denotation for 'I' relative to which (1) is evaluable as true or false. On this account, the syntactic structure of a sentence which contains indexicals or demonstratives is analogous to an open formula: just like an open formula cannot be evaluated as true or false unless a denotation is assigned to its

[2]Montague [**?**], p. 223, fn 2.

free variables, a sentence containing indexicals or demonstratives cannot be evaluated as true or false unless an appropriate semantic value is assigned to its indexicals or demonstratives. The important point is that Lewis and Kaplan, following Montague, assume that the logical form of a sentence which contains indexicals or demonstratives is determined by its syntactic structure. Thus, (1) has a fixed logical form, although it has different truth conditions in different contexts[3].

The interest in context sensitivity has grown exponentially in the last twenty years. Although it is now widely believed that indexicals and demonstratives may be handled in the way suggested by Lewis and Kaplan, it is generally recognized that the class of context sensitive expressions is much wider than that of indexicals and demonstratives. Since there is no agreement on how to deal with most of these expressions, context sensitivity is still an open issue. Yet the underlying view of logical form has not changed. Most of those who are currently interested in context sensitivity, independently of whether they adopt the formal approach suggested by Montague, are inclined to think that logical form is determined by syntactic structure.

A further clarification. We saw that, as far as determination of logical form is involved, syntactic structure is understood as real structure, as opposed to surface structure. The term 'real', however, does not belong to the technical vocabulary of linguistics. A more technical term is 'Logical Form', often abbreviated as 'LF'. In linguistics, the use of this term stems from the conviction that the derivation of a syntactic structure which displays the logical properties of a sentence is continuous with the derivation of other syntactic representations of the sentence. Within current linguistic theories, a LF is understood as a syntactic representation which differs from surface structure and is the primary object of its interpretation. More specifically, a LF is a lexically and structurally disambiguated sequence of word types, where word types are individuated by syntactic and semantic properties[4].

It is easy to see that what linguists now call LF is not what philosophers in the analytic tradition have called logical form. The most striking difference is that logical form has always been understood as a schema or pattern that is distinct from the specific contents expressed by the sentences that instantiate it, and that may be expressed in a formal language of the kind employed by logicians. On this understanding, it is reasonable to expect that sentences with different LFs have the same logical form. So, from now

[3] An account of indexicals and demonstratives along these lines was first suggested in Bar-Hillel [?] and in Montague [?], then developed in Lewis [?], and in Kaplan [?].

[4] The notion of LF emerged in Chomsky [?] and May [?], and was then elaborated in May [?]. As the notion was developed initially, the levels of syntactic representation included Deep Structure (DS), Surface Structure (SS) and Logical Form (LF), with LF derived from SS by the same sorts of transformational rules which derived SS from DS. The role and significance of DS then changed in various ways as Chomsky developed his theory, and in his more recent works, such as Chomsky [?], DS no longer features at all.

on it will be assumed that a principled distinction may be drawn between logical form and LF, and it will be taken for granted that a natural construal of (I) is the claim that logical form is determined by LF[5].

Although this is a natural construal of (I), it is not the only construal of (I). A different construal, which is closer to Davidson's program, is the claim that logical form is determined by semantic structure. The semantic structure of a sentence s may be understood as an intrinsic property of s which depends on the semantic categories of the expressions occurring in s and the way they are combined. The central idea of Davidson's program is that meaning is a matter of truth conditions: to know the meaning of a sentence is to know the conditions under which the sentence is true. Davidson's view of logical form essentially relies on this program: to give the logical form of a sentence is to describe its semantically relevant features against the background of a theory of truth[6].

Among the authors that belong to the intrinsicalist cloud, many work within a broadly Davidsonian perspective. For example, Lycan outlines an account of linguistic meaning which seems to imply a non-syntactic reading of (I). Similarly, Lepore and Ludwig claim that the logical form of a sentence is its "semantic form", as revealed in a compositional theory of meaning. Moreover, some works in event-based semantics, such as those by Parsons and Pietroski, suggest that the same notion of logical form that can provide an elegant compositional semantics for various natural language constructions can also provide a formal explanation of the validity of a wide class of arguments[7].

Note that (I) may be endorsed even if no such connection is postulated between logical form and semantic structure. According to Evans, logical form and semantic structure are to be understood as distinct notions, in that they may be defined in different ways and account for different kinds of inferences. Nonetheless, he treats logical form as an intrinsic property of sentences, which essentially depends on the logical expressions which occur in them[8].

More generally, any view according to which logical form is determined by intrinsic properties of sentences - syntactic or semantic - may be regarded as a version of intrinsicalism. Since the differences between the various versions of intrinsicalism are not relevant for our purposes, we will simply talk of (I) without further distinction[9].

[5]This is the construal of (I) advocated, among others, in Neale [?], Stanley [?] and Borg [?].

[6]Davidson's view of logical form is outlined in Davidson [?] and in Davidson [?].

[7]Lycan [?], Lepore and Ludwig [?], Parsons [?] and Pietroski [?]. The semantic view of logical form defended in García-Carpintero [?] may also be understood as a non-syntactic construal of (I).

[8]Evans [?].

[9]Szabó [?] argues against a view that may be identified with (I), the view that "logical form is an objective feature of a sentence and captures its logical character" (p. 105), on

3 The Relationality Problem

In this section it will be argued that (I) runs into a serious problem. If logical form is determined by intrinsic properties of sentences, every sentence has its own logical form. That is, for every s, there is a formula of some language that expresses the logical form of s. However, as it will be shown, formal explanation requires that the formal representation of sentences is *relational*: the formula assigned to s does not depend simply on s itself, but also on the semantic relations that s bears to other sentences in virtue of the content it expresses. Therefore, an intrinsicalist notion of logical form is not ideal for the purpose of formal explanation.

To illustrate the problem, let us start with some cases that can easily be handled with an intrinsicalist notion of logical form. In what follows it will be assumed that logical forms are exhibited in a standard first order language called L. This is a harmless assumption, given that the point does not essentially depend on it.

Case 1. Consider the following argument:

$$\text{A}\ \frac{\text{(2) The Earth is different from the Moon}}{\text{(3) There are at least two things}}$$

There is a clear sense in which A is valid, namely, that in which it is impossible that its premise is true and its conclusion is false. A plausible way to account for this fact is to say that A has the form $a \neq b; \exists x \exists y x \neq y$, where the semicolon replaces the horizontal line. Since $a \neq b; \exists x \exists y x \neq y$ is a valid form, given that $\exists x \exists y x \neq y$ is a logical consequence of $a \neq b$, the apparent validity of A is formally explained.

Case 2. Consider the following argument:

$$\text{B}\ \frac{\text{(4) The Earth is a planet}}{\text{(5) The Moon is a planet}}$$

There is a clear sense in which B is invalid, namely, that in which it is possible that its premise is true and its conclusion is false. A plausible way to account for this fact is to say that B has the form $Fa; Fb$. Since $Fa; Fb$ is not a valid form, given that that there are models in which Fa is true and Fb is false, the apparent invalidity is formally explained[10].

the basis of considerations that are to a large extent independent of those provided here.

[10] As it is well known, the fact that an argument instantiates an invalid form as represented in a given formal language does not count as a proof of its invalidity. For that language might be unable to capture the structural properties of the argument that determine its validity. But for the present purposes we can leave this issue aside. In the case of B that possibility does not arise, and the same goes for the other cases of invalidity that will be considered.

Case 3. Consider the following sentences:

(6) The Earth is a planet

(7) The Earth is not a planet

If I utter (6) and you utter (7), there is a clear sense in which we are contradicting each other, that is, the things we say cannot both be true, or false. A plausible way to account for this fact is to represent (6) and (7) as Fa and $\sim Fa$. Since Fa and $\sim Fa$ are contradictory formulas, the apparent contradiction is formally explained.

Case 4. Consider the following sentence

(8) The Moon is not a planet

If I utter (6) and you utter (8), there is a clear sense in which we are not contradicting each other, that is, the things we say can both be true, or false. A plausible way to account for this fact is to represent (6) and (8) as Fa and $\sim Fb$. Since Fa and $\sim Fb$ are not contradictory formulas, the apparent lack of contradiction is formally explained.

The formal explanations provided in cases 1-4 are compatible with the adoption of an intrinsicalist notion of logical form. For the formal representations they involve are consistent with the assumption that the logical form of (2)-(8) depends on their intrinsic properties. For example, in case 1 it may be claimed that (2) and (3) are adequately formalized as $a \neq b$ and $\exists x \exists y x \neq y$ because they have a certain syntactic structure. However, this kind of convergence does not always hold. There are cases in which an intrinsicalist notion of logical form is in contrast with the purpose of formal explanation. Here are some such cases.

Case 5. Consider the following argument:

$$\text{C}\ \frac{\text{(9) This is different from this}}{\text{(3) There are at least two things}}$$

Imagine that I'm looking at a picture of the Earth and the Moon and that I utter C pointing my finger at the Earth as I say 'this' the first time and at the Moon as I say 'this' the second time. C seems valid so understood, and it is quite plausible to expect that its validity can be derived from a structural analogy with A. But in order to represent C as structurally similar to A, (9) should be represented as $a \neq b$, which is something that cannot be done if an intrinsicalist notion of logical form is adopted. For according to such a notion, the formal representation of (9) cannot depend on the reference of 'this'.

Case 6. Consider the following argument:

$$\text{D}\ \frac{\text{(10) This is a planet}}{\text{(10) This is a planet}}$$

Imagine that I'm looking at the same picture and that I utter D pointing my finger at the Earth as I say 'this' the first time and at the Moon as I say 'this' the second time. There is a clear sense in which D is invalid so understood, the same sense in which B is invalid. However, if the logical form of (10) depends only on its intrinsic properties, the only form that can be associated with D is a valid form such as $Fa; Fa$.

Case 7. Consider (1) and the following sentence:

(11) You don't like ice cream

Imagine that I utter (1) and that you utter (11) pointing at me. There is a clear sense in which we are contradicting each other, the same sense in which we are contradicting each other in case 3. But if the logical form of (1) and (11) depends on their intrinsic properties, the formula assigned to (11) cannot be the negation of the formula assigned to (1). For example, if the formula assigned to (1) is Fa, that assigned to (11) must be the negation of a formula that stands for 'You like ice cream', such as $\sim Fb$. So the apparent contradiction is not formally explained.

Case 8. Consider the following sentence:

(12) I don't like ice cream

Imagine that I utter (1) and you utter (12). There is a clear sense in which we are not contradicting each other, the same sense in which we are not contradicting each other in case 4. But if the logical form of (1) and (12) depends on their intrinsic properties, the formula assigned to (12) must be the negation of the formula assigned to (1). For example, if Fa stands for (1), then (12) must be represented as $\sim Fa$. So the apparent absence of contradiction is not formally explained.

As cases 5-8 show, formal explanation requires that the formula assigned to s provides a representation of the content expressed by s which exhibits the semantic relations that s bears to other sentences. Consider case 5. In order to account for the apparent entailment, the formal representation of C must exhibit a semantic relation between the content of (9) and the content of (3) which is captured if (9) is rendered as $a \neq b$. But such representation is not derivable from the intrinsic properties of (9) and (3). The reason why different individual constants a and b are assigned to the two occurrences of 'this' in (9) is that those occurrences refer to different things. Now consider case 6. In order to account for the apparent lack of entailment, the formal representation of D must exhibit a semantic relation between the contents of the two occurrences of (10) which is captured if the first is rendered as Fa and the second is rendered as Fb. But what justifies the assignment of a in the first case and b in the second is that 'this' refers to different things. This is not something that can be detected from (10) itself. No analysis of the intrinsic properties of (10) can justify the conclusion that the individual constant to be assigned in the second case must differ from a. Similar considerations hold for cases 7 and 8.

Three final notes may help to appreciate the point about relationality. First, note that we are reasoning under the assumption that cases 5-8 do not involve ambiguity, as explained in section **??**. In some cases, this assumption might be questioned. For example, in case 5 it might be argued that (9) is ambiguous between two syntactic structures, one which contains two occurrences of the same item 'this$_1$', and one which contains two different items 'this$_1$' and 'this$_2$'. If (9) were ambiguous in this way, the problem considered would not arise. For it would be consistent with intrinsicalist assumptions to represent (9) as $a \neq b$ on the second reading. But it is far from obvious that the appeal to ambiguity can work in all cases. For example, in cases 7 and 8 it would be unnatural to claim that the sentences involved are ambiguous[11].

Second, note that the point about relationality must not be confused with the usual claim that the real terms of logical relations are propositions rather than sentences. That claim by itself does not imply a formalization of the kind suggested. Suppose that in case 6 two distinct propositions p_1 and p_2 are expressed by the two occurrences of (10). If logical forms are understood as properties of propositions individuated in terms of some structural feature that p_1 and p_2 share, such as being about an individual that satisfies a condition, and this feature is expressed by a given formula, then that formula is to be assigned to both occurrences of the sentence. Thus, $Fa; Fa$ or $Fb; Fb$ could be adopted as formal representations of D.

Third, note that the explanatory shortcoming illustrated by cases 5-8 arises not only if it is assumed that the logical form of a sentence is expressed by a single formula, but also if it is assumed, for some set of formulas, that the logical form of the sentence is expressed by any member of the set, or by the set itself. As long as the semantic relations between the contents expressed by the relevant set of sentences are not taken into account, there is no way to justify an appropriate choice of members of the set. Take case 6 again. Even if it assumed that the logical form of (10) is expressed by a set of formulas $\{Fa, Fb, ...\}$, there is no way to justify an assignment of different individual constants a and b to the two occurrences of (10). No distinction can be drawn between $Fa; Fb$ and $Fa; Fa$ unless some semantic relation between the two occurrences is taken into account.

[11]Obviously, one might be willing to hold a radical view according to which context sensitivity can always be treated at the syntactic level like ambiguity, as in Gauker [**?**]. For example, one might claim that there is a distinct lexical item for each referent of 'this', and therefore that infinitely many syntactic structures can be associated to (9). However, such a view could hardly be invoked to defend (I), as it implies that syntactic structure in the relevant sense is not an intrinsic property of a sentence.

4 Generalization

The problem that emerges from cases 5-8 may easily be generalized. Cases 5-8, unlike cases 1-4, involve sentences which contain indexicals or demonstratives. But similar examples may be provided with sentences affected by other forms of context sensitivity. Consider the following sentences:

(13) All beers are cool

(14) Not all beers are cool

Imagine that you utter (13) to assert that all beers in a given fridge are cool, while I utter (14) to assert that some beers in another fridge are not cool. As in case 8, there is an obvious sense in which we are not contradicting each other. But if the formal representation of (13) and (14) does not take into account the content they express, the apparent absence of contradiction is not formally explained. For the formula assigned to (14) must be the negation of that assigned to (13).

More generally, let Γ be a set of sentences some of which contain context sensitive expressions. In order to provide a formal explanation of the logical relations in Γ, the formal representation of Γ must display the semantic relations between the contents expressed by the sentences in Γ. But this is not possible if an intrinsicalist notion of logical form is adopted. For according to such a notion, each of the sentences in Γ has a unique logical form which does not depend on the content it expresses. This is a serious limitation, which prevents an intrinsicalist notion of logical form from being ideal for the purpose of formal explanation.

An advocate of (I) may be tempted to reply as follows. Certainly, an intrinsicalist notion of logical form is unable to provide a formal explanation of some logical relations, such as those involved in cases 5-8. But there is nothing wrong with this. For it should not be expected that all logical relations are explained formally. Presumably, some logical relations can be explained formally, such as those involved in cases 1-4, while others can be explained in some other way, such as those involved in cases 5-8. Since an intrinsicalist notion is able to handle the cases of the first kind, its logical significance is not in question.

However, this reply is unsatisfactory for at least two reasons. In the first place, its force is inversely proportional to the wideness of the class of cases that is taken to fall outside the domain of formal explanation. Context sensitivity is a very pervasive phenomenon. Its boundaries are so hard to demarcate that it is not even uncontroversial that there are nontrivial cases of context *in*sensitivity. Therefore, if the class of cases that is taken to fall outside the domain of formal explanation is characterized in terms of context sensitivity, then it is potentially unlimited. Obviously, one might be willing to claim that context sensitivity affects only a very limited class of expressions. However, this would be a specific position within the debate on context sensitivity, for which further arguments should be provided. Independently of the tenability of such position, it is sensible to assume that the issue of whether a certain notion of logical form is suitable for the purpose of formal explanation should not depend on the issue of which sentences are affected by context sensitivity[12].

In the second place, even if a principled distinction could be drawn between cases involving context sensitivity and cases not involving context sensitivity, that distinction would not provide a good criterion for the distinction between formally explainable logical relations and formally unexplainable logical relations. For at least some cases involving context sensitivity *can* be handled with an intrinsicalist notion of logical form. Consider the following argument:

$$\text{E}\ \frac{\text{(15) This is red}}{\text{(16) Something is red}}$$

Here the apparent entailment can formally be explained if E is represented as $Fa; \exists x Fx$, and it is easy to see that this representation is compatible with the adoption of an intrinsicalist notion of logical form, even though (15) contains a demonstrative. Therefore, in order to defend (I), it should be maintained that some cases involving context sensitivity deserve a formal explanation, while others do not. But it is hard to see how such difference can be independently motivated.

5 The truth conditional notion of logical form

So far it has been suggested that an intrinsicalist notion of logical form is not ideal for the purpose of formal explanation, because it is unable to account for some patent logical relations. This is a reason to doubt (I). Yet it is not a decisive reason. Even if it were granted that an intrinsicalist notion of logical form has a limited explanatory power, it might still be argued that it is our best option, as no other kind of notion can do better. To complete the case against (I), it will be argued that there is an intelligible extrinsicalist notion of logical form that can do better, the *truth conditional notion*.

According to the truth conditional notion, logical form is determined by truth conditions. This is not a widely accepted criterion of individuation. The truth conditional notion is definitely less in vogue than the syntactic notion. But it is at least as close to the conception of logical form that emerges from the classical works that mark the origin of the analytic tradition. An emblematic case is Russell's theory of descriptions, which may

[12] Borg [?], pp. 62-73, openly defends (I) in combination with a position of the kind considered.

be contrasted with Davidson's theory of action sentences. Both Russell and Davidson claim that some problems that arise in connection with certain sentences can be solved if the content of those sentences is elucidated by means of a paraphrase that exhibits their hidden quantificational structure. However, while Davidson takes the paraphrase to provide the semantic structure of the target sentences, as part of a systematic theory of the language to which they belong, Russell suggests that the paraphrase shows the truth conditions of the target sentences, so it accounts for the logical properties of the judgements they express. For Russell, the primary constraint on logical form is imposed by the need to explain the inferential relations between judgements, rather than by the need to explain the syntactic or semantic properties of sentences. In this respect, the truth conditional notion is definitely Russellian[13].

As it will be shown, a formal account of a set of sentences based on the truth conditional notion - a *truth conditional analysis* - rests on the idea that an adequate formalization of a set of sentences must provide a representation of the contents they express at least in the obvious sense that it must exhibit their truth conditions. This idea seems plausible enough. In logic textbooks it is commonly taken for granted that a representation of a set of sentences in a formal language must provide an account of the possible truth values of the sentences in the set. So it is usually expected that the relations of identity and difference between their truth conditions are made explicit. Consider a representation in L of (4) and (5). As undergraduate logic students know, different formulas must be assigned to (4) and (5), say Fa and Fb. For (4) and (5) have different truth conditions, so one of them might be true and the other false. By contrast, consider a representation in L of (4) and the following sentence:

(17) The Earth is indeed a planet

In this case the same formula, say Fa, can be used for both (4) and (17). For no possible arrangement of truth values will fail to be represented.

On the understanding of adequate formalization that will be adopted, the truth conditions of a sentence depend on the state of affairs that the sentence describes as obtaining. For example, (4) and (17) have the same truth conditions, for they both describe the Earth as being a planet. By contrast, (4) and (5) have different truth conditions, because (4) describes the Earth as being a planet while (5) describes the Moon as being a planet. This is just a rough characterization which certainly does not settle every issue concerning sameness of truth conditions. In particular, it does not entail that sameness of truth conditions amounts to sameness of "modal profile", understood as

[13] Russell's theory of descriptions is outlined in Russell [**?**]. Davidson's theory of action sentences is outlined in Davidson [**?**]. Sainsbury [**?**], section 2.5, spells out the differences between Russell and Davidson on logical form.

truth in the same possible worlds. Although sameness of modal profile may be regarded as a necessary condition for sameness of truth conditions, it is not entirely obvious that it is a sufficient condition. Consider the following sentences:

(18) 2 is even

(19) 3 is prime

It is consistent with the characterization provided to say that (18) and (19) have different truth conditions, in that they describe different objects as having different properties, even though they have the same modal profile.

Note that, on the assumption that sameness of modal profile is a necessary condition for sameness of truth conditions, describing the same object as having the same property can hardly be regarded as a sufficient condition either. For example, both 'Rome is pretty' and 'The capital of Italy is pretty' describe Rome as being pretty, but it is plausible that they do not have the same truth conditions precisely because they do not have the same modal profile. However, for the purposes at hand it is not essential to specify a set of necessary and sufficient conditions for sameness of truth conditions. The understanding of adequate formalization that will be adopted is consistent with more than one way to define sameness of truth conditions.

6 Adequate formalization

The line of thought that substantiates the truth conditional notion of logical form rests on three assumptions. The first expresses a basic constraint on adequate formalization. Let $\bar{x}$ be an n-tuple $\langle x_1, ..., x_n \rangle$. Let $\approx_x$ be an equivalence relation defined for xs. Let it be agreed that, for two n-tuples $\bar{x}$ and $\bar{y}$, $\bar{y}$ *mirrors* $\bar{x}$ if and only if, for every $i, k \leq n$, $x_i \approx_x x_k$ if and only if $y_i \approx_y y_k$. The constraint is that, given an n-tuple of sentences $\bar{s}$ with truth conditions $\bar{t}$, an n-tuple of formulas $\bar{\alpha}$ adequately formalizes $\bar{s}$ only if $\bar{\alpha}$ mirrors $\bar{t}$. The expression '$\bar{\alpha}$ mirrors $\bar{t}$' may be understood in more than one way, depending on how the relations $\approx_\alpha$ and $\approx_t$ are defined. But for the sake of simplicity it will be taken for granted that equivalence for formulas amounts to sameness of truth value in every model, while equivalence for truth conditions amounts to identity, namely, that $t_i \approx_t t_k$ just in case $t_i = t_k$. Given the constraint just stated, the first assumption may be phrased as follows:

(A1) Formulas mirror truth conditions.

That is, for every $\bar{s}$ with truth conditions $\bar{t}$ and every $\bar{\alpha}$ that adequately formalizes $\bar{s}$, $\bar{\alpha}$ mirrors $\bar{t}$.

Note that (A1) expresses only a constraint on adequate formalization, so it is not intended to provide a full account of adequate formalization. When an n-tuple of sentences $\bar{s}$ is represented in a formal language by means of an n-tuple of formulas $\bar{\alpha}$, the representation is intended to capture what is said by using these sentences, in some sense of 'what is said' that is relevant for the purpose of formal explanation. So it is reasonable to think that only some of the n-tuples of formulas that satisfy the constraint expressed by (A1) adequately formalize $\bar{s}$. For example, it is usually taken for granted that Fa is better than $Fa \wedge (((Fb \vee Fc) \wedge \sim Fb) \supset Fc)$ as a representation of (4). Even though $Fa \wedge (((Fb \vee Fc) \wedge \sim Fb) \supset Fc)$ has the same truth value as Fa in every model, it does not capture what is said by using (4) in the relevant sense of 'what is said'. The rationale that is usually adopted is that, in order to adequately formalize a sentence, one should choose a formula whose complexity is strictly that required by a correct analysis of the content of the sentence.

The second assumption states the generally accepted fact that there is no one-to-one correspondence between sentences and truth conditions: the same sentence may have different truth conditions, and different sentences may have the same truth conditions. We saw that (1) uttered by me and (1) uttered by you have different truth conditions, while (12) uttered by me and (11) uttered by you, pointing at me, have the same truth conditions. Assuming that an *interpretation* of s fixes definite truth conditions for s in that it determines its content, this fact may be stated by saying that the truth conditions of s as it is used on a certain occasion depends on the intended interpretation of s. The second assumption may then be stated as follows:

(A2) Truth conditions do not mirror sentences.

That is, it is not the case that, for every $\bar{s}$ with truth conditions $\bar{t}$, $\bar{t}$ mirrors $\bar{s}$. Again, for the sake of simplicity it may be taken for granted that equivalence for sentences amounts to identity, namely, that $s_i \approx_s s_k$ just in case $s_i = s_k$[14].

The third assumption rests on the relatively uncontroversial claim that the logical form of a set of sentences is expressed by an adequate formalization of the set. The assumption may be stated as follows:

(A3) Logical forms mirror formulas.

That is, if $\bar{s}$ is adequately formalized by $\bar{\alpha}$, then the logical form of each sentence in $\bar{s}$ is expressed by the corresponding formula in $\bar{\alpha}$. This means that the same $\bar{\alpha}$ may be regarded as an n-tuple of logical forms. (A3) amounts to a strict reading of the uncontroversial claim, although it is not

[14]Another option would be to define some relation of equivalence that takes care of logically irrelevant grammatical differences between sentences, such as that between (17) and (19).

the only possible reading[15].

(A1) and (A2) entail that it is not the case that, for every $\bar{s}$ and every $\bar{\alpha}$ that adequately formalizes $\bar{s}$, $\bar{\alpha}$ mirrors $\bar{s}$. That is, formulas do not mirror sentences. Mirroring is an equivalence relation, so if $\bar{\alpha}$ mirrors $\bar{t}$ but $\bar{t}$ does not mirror $\bar{s}$, then $\bar{\alpha}$ does not mirror $\bar{s}$. From this and (A3) it follows that it is not the case that for every $\bar{s}$, every n-tuple of logical forms expressed by an adequate formalization of $\bar{s}$ mirrors $\bar{s}$. That is, logical forms do not mirror sentences.

The conclusion just drawn implies that there is no such thing as "the" logical form of a sentence s, in that s has a logical form only relative to this or that interpretation. Similarly, s and s' can be said to have the same logical form, or different logical forms, only relative to this or that interpretation. Sentences are formalized in virtue of the relations of identity and difference between their truth conditions, so the question whether two sentences have the same logical form depends on such relations.

The notion of logical form that emerges from the line of thought set out is plainly truth conditional: the logical form of a sentence s in an interpretation i is determined by the truth conditions that s has in i. Let us assume that, for any n-tuple of sentences $\bar{s}$, an *interpretation* of $\bar{s}$ is an n-tuple $\bar{i}$ such that each term in $\bar{i}$ is an interpretation of the corresponding term in $\bar{s}$. The criterion of individuation that underlies the truth conditional notion of logical form may be stated as follows:

(LF) $\bar{s}$ has logical form $\bar{\alpha}$ in $\bar{i}$ if and only if $\bar{s}$ is adequately formalized by $\bar{\alpha}$ in $\bar{i}$.

If $\bar{s}$ has exactly one term, we get that s has logical form α in i if and only if s is adequately formalized by α in i.

7 A truth conditional analysis

The truth conditional notion of logical form provides a satisfactory account of all the cases considered in section **??**. Let us begin with cases 1-4, which cause no trouble to an intrinsicalist notion. In case 1, the pair of sentences at issue is $\langle(2),(3)\rangle$. We saw that the apparent validity of A is formally explained if $\langle(2),(3)\rangle$ is represented as $\langle a \neq b, \exists x \exists y x \neq y\rangle$. This representation is clearly consistent with (LF). Assuming that the intended interpretation of $\langle(2),(3)\rangle$ is such that 'the Earth' refers to the Earth and 'the Moon' refers to the Moon, in that interpretation (2) and (3) are adequately formalized as $a \neq b$ and $\exists x \exists y x \neq y$.

[15] Considerations in support of the claim that the logical form of a set of sentences is expressed by an adequate formalization of the set are offered in Brun [**?**], p. 27, and in Baumgartner and Lampert [**?**], p. 104.

Consider case 2. We saw that the apparent invalidity of B is formally explained if $\langle(4),(5)\rangle$ is represented as $\langle Fa, Fb\rangle$. Again, it is easy to see that this representation is consistent with (LF), in that (4) and (5) are adequately formalized as Fa and Fb in the intended interpretation.

Cases 3 and 4 are analogous. While $\langle(6),(7)\rangle$ may be represented as $\langle Fa, \sim Fa\rangle$, $\langle(6),(8)\rangle$ may be represented as $\langle Fa, \sim Fb\rangle$. Both representations are justified if it is assumed that the formula assigned to each sentence displays its truth conditions.

Now let us consider cases 5-8, which do cause trouble to an intrinsicalist notion. Case 5 involves an argument, C, that seems valid if understood in the way described. Since the two occurrences of 'this' refer to different persons in the intended interpretation of $\langle(9),(3)\rangle$, it is consistent with (LF) to represent $\langle(9),(3)\rangle$ as $\langle a \neq b, \exists x \exists y x \neq y\rangle$ in that interpretation. So the apparent validity of C is formally explained exactly like apparent validity of A.

Case 6 involves an argument, D, that seems invalid if understood in the way described. Again, since the two occurrences of 'this' refer to different persons in the intended interpretation of $\langle(10),(10)\rangle$, it is consistent with (LF) to represent $\langle(10),(10)\rangle$ as $\langle Fa, Fb\rangle$ in that interpretation. So the apparent invalidity of D is formally explained.

Cases 7 and 8 are analogous. If I utter (1) and you utter (11) pointing at me, the sense in which we are contradicting each other is formally explained if $\langle(1),(11)\rangle$ is represented as $\langle Fa, \sim Fa\rangle$ in the intended interpretation. Similarly, if I utter (1) and you utter (12), the sense in which we are not contradicting each other is formally explained if $\langle(1),(12)\rangle$ is represented as $\langle Fa, \sim Fb\rangle$ in the intended interpretation.

In substance, the truth conditional notion can provide a formal explanation of both the logical relations considered in cases 1-4 and those considered in cases 5-8. In cases 1-4, the kind of formal representation supported by the truth conditional notion is the same as that supported by an intrinsicalist notion. Instead, in cases 5-8 the truth conditional notion supports a kind of formal representation that cannot be justified on the basis of an intrinsicalist notion. Even though cases 1-4 differ from cases 5-8, at least if it is assumed that only the latter involve context sensitivity, the method of formal representation is exactly the same, in that it hinges on truth conditions.

More generally, the truth conditional notion can provide a formal explanation of both the logical relations that obtain in cases which do not involve context sensitivity and those that obtain in cases which do involve context sensitivity, including the example considered in section **??** and many others. As far as the truth conditional notion is concerned, no relevant distinction can be drawn between context sensitive and context insensitive sentences. For all that matters to formalization is that sentences have truth conditions relative to interpretations.

The advantage of the truth conditional notion over an intrinsicalist notion is not just a matter of amount of cases explained. The fact that both kinds of cases can be explained in terms of truth conditions suggests that an intrinsicalist notion gets things wrong even when it is applied to cases of the first kind. For it suggests that the real ground of the formal representations supported by such a notion is not really the one that an intrinsicalist has in mind. For example, an intrinsicalist will be apt to think that (2) and (3) are adequately formalized as $a \neq b$ and $\exists x \exists y x \neq y$ *because* they have a certain syntactic structure. But this is questionable. Even though that formalization is consistent with the hypothesis that logical form is determined by syntactic structure, it is equally consistent with the hypothesis that logical form is determined by truth conditions. According to the latter hypothesis, (2) and (3) are adequately formalized as $a \neq b$ and $\exists x \exists y x \neq y$ *because* they have certain truth conditions.

8 Some objections

Although the truth conditional notion provides a satisfactory explanation of a wide variety of cases, it might be contended that it is unsatisfactory in other respects. This sections considers three objections that might be raised against the understanding of adequate formalization that underlies the truth conditional notion, in order to show that they do not resist scrutiny.

The first objection concerns equivalences such as the following:

(21) Jack went up the hill and Jill went up the hill

(22) Jill went up the hill and Jack went up the hill

(23) Not all Martians are green

(24) Some Martians are not green

The equivalence between (21) and (22) seems to hold for a purely logical reason, that is, the commutativity of conjunction. Similarly, the equivalence between (23) and (24) seems to hold for a purely logical reason, that is, the interdefinability of quantifiers. However, the objection goes, if formulas stand for truth conditions, (21) and (22) must be represented by the same formula, and the same goes for (23) and (24). So it turns out that all equivalences have a trivial proof, in that they follow from the validity of $\alpha \supset \alpha$[16].

[16] An objection along these lines is raised in Davidson [?], p. 145, in Brun [?], p. 12, and in Baumgartner and Lampert [?], pp. 101-102. Brun [?] talks of propositions, rather than of truth conditions, but the substance does not change. Moreover, in Brun [?] and in Baumgartner and Lampert [?] the objection is intended to generalize to all equivalences, so it does not take into account the possibility that two equivalent sentences have different truth conditions.

This objection poses no serious threat to a truth conditional analysis. Let us grant that (21) and (22) have the same truth conditions, as the objection requires. First of all, note that from (A1) it doesn't follow that the same formula must be assigned to (21) and (22). For it is consistent with (A1) to represent (21) and (22) as $Rab \wedge Rcb$ and $Rcb \wedge Rab$, given that these two formulas have the same truth value in every structure. What follows from (A1) is that the same formula *can* be assigned to (21) and (22). Now suppose that the same formula, say $Rab \wedge Rcb$, is assigned to (21) and (22). Even in this case, it is questionable that the explanation of the equivalence between (21) and (22) is trivial. For the same logical reason that warrants the equivalence between $Rab \wedge Rcb$ and $Rcb \wedge Rab$ justifies the assignment of $Rab \wedge Rcb$ to (21) and (22) as part of the analysis of (21) and (22). Similar considerations apply to the case of (23) and (24).

Moreover, independently of the triviality issue, it is not obvious that there is something wrong with the supposition that the same formula is assigned to (21) and (22), or to (23) and (24). Imagine a written logic exam in which students are asked to formalize an argument containing (21) and (22), and suppose that one of them uses the formula $Rab \wedge Rcb$ to represent both sentences. In this case, it would be unfair for the teacher to mark the formalization as mistaken. The same would go for a case in which the student formalizes (23) and (24) as $\sim \forall x(Mx \supset Gx)$. After all, the student might say, why should this difference matter, if it doesn't matter to the validity or invalidity of the argument?[17]

The second objection concerns cases of synonymy. Consider the following sentences:

(25) Donald is a drake

(26) Donald is a male duck

Since (25) and (26) are synonymous, they have the same truth conditions. Therefore, if formulas represent truth conditions, (25) is adequately formalized as $Fa \wedge Ga$. This entails that the following argument is adequately formalized as $Fa \wedge Ga; Ga$:

$$\text{F}\ \frac{\text{(25) Donald is a drake}}{\text{(27) Donald is a duck}}$$

However, the objection goes, this constitutes a serious problem. For it turns out that materially valid arguments, which should be counted as formally invalid, are represented as trivially formally valid. Unless one is willing to

[17] If the teacher weren't moved, the student might quote Frege, and invoke his notion of "conceptual content". Note, among other things, that $Rab \wedge Rcb$ and $Rcb \wedge Rab$ are formulas of the same complexity, and the same goes for $\sim \forall x(Mx \supset Gx)$ and $\exists x(Mx \wedge \sim Gx)$, in accordance with the criterion considered in section **??**.

endorse the "Tractarian vision", according to which all validity is formal validity, such a consequence must be avoided[18].

This objection may easily be countered. First of all, leaving aside the question whether the Tractarian vision is really undesirable, a truth conditional analysis does not entail that vision. Even if it is granted that some valid arguments based on synonymy can be represented as formally valid, this is not to say that all valid arguments are formally valid. It is consistent with a truth conditional analysis to hold that there are valid arguments which no amount of analysis can represent as formally valid. For example, the following could be one of them:

$$\text{G}\ \frac{\text{(28) The sea is blue}}{\text{(29) The sea is not yellow}}$$

Secondly, it is not clear why F should not be represented as $Fa \wedge Ga; Ga$. Although $Fa \wedge Ga; Ga$ is a trivially valid argument form, this does not mean that F is trivially valid. For it is not trivial that F instantiates that form[19].

Certainly, one might insist that F should not be counted as formally valid because its validity depends on a semantic relation that can be elucidated only by means of conceptual analysis. But in order to defend such a position, one would have to justify a hardly tenable claim, namely, that adequate formalization does not involve conceptual analysis. It is widely recognized that many paradigmatic cases of adequate formalization, such as Russell's theory of descriptions, do involve conceptual analysis at least to some extent, and it is easy to see that there is no principled way to set a threshold for the amount of conceptual analysis needed.

The third objection concerns an idea which underlies the method of formalization adopted in section **??**, the idea that distinct symbols denote distinct objects. Consider the following sentences:

(30) Hesperus is a star

(31) Phosphorus is a star

Since 'Hesperus' and 'Phosphorus' refer to the same planet, (30) and (31) must have the same logical form in any interpretation, say Fa. But one needs substantive empirical information to know that 'Hesperus' and 'Phosphorus' refer to the same planet. This means that one needs substantive empirical information to grasp the logical form of (30) and (31). Therefore, the objection goes, the idea that distinct symbols denote distinct objects

[18] This objection is raised in Brun [**?**], pp. 12-13. The label 'Tractarian vision' comes from Sainsbury [**?**], pp. 348-355.

[19] Some arguments against the Tractarian vision are discussed in Sainsbury [**?**], pp. 348-355, and in Baumgartner and Lampert [**?**], pp. 105-106.

entails that knowledge of reference is part of semantic competence, contrary to what it is reasonable to expect.

Against this objection it may be contended that, even if it is granted that knowledge of reference is not part of semantic competence, which is not entirely obvious, it is questionable that the claim that (30) and (31) have the same logical form entails the opposite conclusion. In order to get that conclusion, it should be assumed in addition that knowledge of logical form is part of semantic competence. But the additional assumption may be rejected. If one adopts the truth conditional notion, one may coherently maintain that semantic competence does not include knowledge of the fact that (30) and (31) have the same logical form, just because the latter involves substantive empirical information that does not pertain to semantic competence.

Note that a truth conditional analysis is not intended to provide an empirically plausible account of language use. Such analysis by no means implies that one has to "go through" the logical form of a sentence in order to grasp its truth conditions. What it suggests is rather the contrary: the ascription of logical form to a sentence requires prior understanding of its truth conditions. One is in a position to adequately formalize (30) and (31) only when one knows that 'Hesperus' and 'Phosphorus' refer to the same planet. On a truth conditional analysis, there is no interesting sense in which logical form is "transparent". The logical form of a sentence may not be detectable from the sequence of words which constitutes it. This is not just to say that there may be a systematic divergence between surface structure and logical form that is knowable *a priori* as a result of conceptual analysis. The understanding of logical form may involve empirical information that is not so knowable. So, using a sentence correctly by no means entails being in a position to know its logical form.

From the responses to the second and the third objection it turns out that a truth conditional analysis has significant implications concerning the extension of the domain of formal explanation, as it suggests that formal principles apply in cases in which it is commonly believed that they do not apply. For example, the following argument is analogous to F in this respect:

$$\text{H}\ \frac{\text{(30) Hesperus is a star}}{\text{(31) Phosphorus is a star}}$$

H is one of those valid arguments that are usually regarded as formally invalid. However, on a truth conditional analysis it may be claimed that H is adequately formalized as $Fa; Fa$, so that it is formally valid.

As in the case of F, it is pointless to insist that H is formally invalid by appealing to the distinction between formal validity and material validity. In this case, one might invoke some sort of transparency that is assumed to characterize logical necessity, as opposed to metaphysical necessity. However, as it has been explained, the truth conditional notion does not justify such transparency assumption. Thus it is pointless to argue, say, that H is formally invalid because the connection between (30) and (31) is not detectable from the meaning of some "logical" expressions occurring in them.

Moreover, it cannot be contended that a truth conditional analysis entails that formal validity reduces to necessary truth preservation and so blurs the distinction between logical necessity and metaphysical necessity. For we saw that it is not essential to such an account to assume that any two necessary sentences have the same truth conditions. It is consistent with the characterization of truth conditions given in section **??** to say that (18) and (19) have different truth conditions, hence that there is no formal explanation of the validity of the following argument:

$$\text{I}\ \frac{\text{(18) 2 is even}}{\text{(19) 3 is prime}}$$

Again, a truth conditional analysis entails at most that some necessarily truth preserving arguments are formally tractable, which is something that anyone should accept.

9 Extrinsicalism

From the foregoing sections it turns out that the truth conditional notion of logical form can provide a coherent account of a wide variety of cases that involve fundamental logical relations, and that its explanatory power is not subject to the limitations that affect an intrinsicalist notion. This suggests that an intrinsicalist notion is unsuitable for the purpose of formal explanation. So it suggests that (I) is ungrounded. For (I) entails that an intrinsicalist notion fulfils the logical role.

Since (I) is the view that is usually taken to substantiate (UT), if (I) is ungrounded, it is reasonable to think that the same goes for (UT). Strictly speaking, a denial of (I) does not entail a denial of (UT). But if (I) is rejected, it seems that no viable alternative can be offered. The only alternative to (I) would be *extrinsicalism*, the view that logical form is determined by extrinsic properties of sentences:

(E) There is a unique extrinsicalist notion of logical form which fulfils both the logical role and the semantic role.

However, (E) is untenable. An extrinsicalist notion of logical form, such as the truth conditional notion, can hardly fulfil the semantic role. For that role requires that logical form features as part of a compositional account of meaning. The meaning of a sentence s - assuming that there is such a thing

- is an intrinsic property of s that is determined by the conventions that are constitutive of the language to which s belongs. So it cannot be explained in terms of the truth conditions of s, for the truth conditions of s are not an intrinsic property of s.

Of course, as it turns out from section **??**, there is a sense of 'truth conditions' in which it is plausible to say that the meaning of s can be explained in terms of its truth conditions: it is the sense, suggested by Davidson, in which the truth conditions of s are revealed by semantic structure. For example, from the semantic structure of (1) it turns out that (1) is true in a context if and only if the speaker of the context has the property of liking ice cream. But this is not the sense of 'truth conditions' that underlies the truth conditional notion, because it is not the sense in which formal explanation requires that logical form is determined by truth conditions. As it has been suggested in section **??**, what matters to formal explanation is the content expressed by s, rather than its semantic structure. For example, what must be taken into account in case 7 is the content expressed by (1), not its semantic structure. The distinction between the semantic structure of s and the content expressed by s is crucial because the first is an intrinsic property of s, while the second is an extrinsic property of s. Any account of the meaning of s which involves a notion of logical form defined in terms of the first property is inconsistent with (E). To endorse (E), by contrast, is to hold the unjustified belief that a notion of logical form defined in terms of the second property can provide an account of the meaning of s without requiring other notions.

Note that the distinction between the semantic structure of s and the content expressed by s does not imply that the content expressed by s is not itself structured. The crux of the matter is that the latter is extrinsic, not that it is unstructured. To illustrate the difference, it will suffice to focus on a widely debated account of structured contents, the Russellian view that the content expressed by s is a proposition that is constituted by the semantic values - individuals, properties and relations - of some of the expressions occurring in s, and that has a structure which resembles the structure of s. What has been said so far is consistent with this view: nothing prevents contents from being structured propositions. For example the content expressed by (1) might be a structured proposition that includes the speaker as a constituent. But even if the content expressed by s is a structured proposition, it differs from the semantic structure of s in that it is an extrinsic property of s. So the point remains that a notion of logical form defined in terms of such property can hardly provide an account of the meaning of s without requiring other notions[20].

[20] The view is sketched in Kaplan [**?**], pp. 494-495, where it is attributed to Russell, and it is developed by Soames and Salmon in Soames [**?**], Salmon [**?**] and other works. The theory of structured propositions advocated by King in King [**?**] and other works may also be classified as Russellian.

This last remark prevents a possible reaction against the claim that (E) is untenable. One might get the impression that (E) should not be dismissed because it is at least arguable that (i) logical form is to be understood as a property of structured propositions, as Russell suggested, and (ii) the notion of logical form so understood can simultaneously play the logical role and the semantic role. However, this impression is misleading. Although there is nothing wrong with (i), the viability of (ii) is only apparent. If one assumes that contents are structured propositions, and defines logical form in the way suggested in section **??**, one can offer at most a formal description of the kind of structured proposition expressed by s, that is, a formal description of what the different structured propositions expressed by s have in common. For example, as it turns out from section **??**, the different structured propositions expressed by (1) are represented by the same kind of formula. But in order to provide an account of the meaning of s, one should explain how the words occurring in s and the way they are combined determines that kind of structured proposition. So one would need a structural description of s which is not derivable from its logical form, which means that the notion of logical form would not suffice. Perhaps this is why structured proposition theorists typically do not adopt an extrinisicalist notion of logical form, and favour (I) rather than (E)[21].

10 The Myth of Uniqueness

To say that (UT) is ungrounded is to say that there is no reason to think that a unique notion of logical form fulfils both the logical role and the semantic role. (UT) is a Holy Grail sort of view. Traditionally, those who believe in (UT) tend to think that, although logical form may be very hard to find, once you find it you'll get everything you want. All your problems will be solved. To reject (UT), instead, is to think that the Holy Grail does not exist. The use of the term 'logical form' may be motivated by different theoretical purposes, and it should not be taken for granted that a unique notion can satisfy all those purposes. As Quine once said,

> The grammarian's purpose is to put the sentence into a form that can be generated by a grammatical tree in the most efficient way. The logician's purpose is to put the sentence into a form that admits most efficiently of logical calculation, or show its implications and conceptual affinities most perspicuously, obviating fallacy and paradox[22].

It is important to understand that the rejection of (UT) does not entail that there is something wrong with this or that notion of logical form. A

[21] The paradigmatic example is Kaplan, whose theory of indexicals and demonstratives combines (I) with the idea that contents are structured propositions.

[22] Quine [**?**], pp. 451-452.

notion is simply a notion, it is not a view. As far as an intrinsicalist notion of logical form is concerned, (UT) could be false, or it could be true in virtue of some other kind of notion. The same goes for an extrinsicalist notion of logical form. In other words, one thing is a notion of logical form, quite another thing is a view that implies a uniqueness claim about that notion.

What this paper suggests is that, if (UT) is abandoned, it becomes clear that different notions of logical form can play different roles. On the one hand, the syntactic notion suits the semantic role, although it is unsuitable for the logical role. On the other, the truth conditional notion suits the logical role, although it is unsuitable for the semantic role. This means that, although (C1) and (C2) are plausibly true, they are not univocally true. That is, they are not true in virtue of the same reading of 'logical form'.