

Expressivism about logical forms

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1. Logical form in the real world

The concept of *logical form* is intimately connected with modern logic; especially after Frege, Russell and others' insistence that the surface forms of sentences are potentially very misleading guides to their underlying logic. It is now commonly accepted that a logical form is what substantiates the logical properties of a sentence (or more generally, an expression); however, there is little agreement on what these logical forms *are*. The many theories concerning their nature seem to source them variously in a Platonist heaven, inside the human mind, or out in the real world¹.

One important, relatively novel recent view on the nature of logic is that logic is a science as any other, and that, far from being grounded in any "a priori analysis" or "metaphysics", it is an investigation of a part or aspect of the world parallel to the investigations of other scientific disciplines². A subspecies of this approach is the "naturalistic" one, which claims that not only is logic a science, but that it is more closely affiliated to an empirical, natural science such as physics than it is to an armchair one, such as mathematics³.

In this paper, I want to explore the consequences of this naturalistic approach to logic with a focus on how it would explicate logical forms. Within this context, explaining the nature of logical forms is demanding - it not being obvious from where they are sourced. The solution I propose is that logical forms are not part of the subject matter of logic at all, that they are rather *gizmos to be found within its methodological toolbox*. They are not "out there" to be captured, they are rather the creations of logicians wishing to plot individual expressions on the "inferential landscape" of language.

That logic is a theory which does not aim at a direct capturing of logical forms and logical laws, but rather at mapping the "inferential landscape" (within a process of zooming in on a *reflective equilibrium*) we argued elsewhere (Peregrin & Svoboda, 2017). Here I take this view to its consequences, especially those concerning logical forms. I argue that logical forms are outcomes of the mapping – that their fundamental function is to allow us express, in an explicit form, the positions of corresponding expressions within the network of inferential relations forming the inferential structure of language.

¹ See, e.g., Sainsbury (1991), Preyer, Gerhard and Peter, Georg (2002), or Iacona (2018).

² See Priest (2016), Hjortland (2017), or Williamson (2017).

³ See Peregrin (2019).

2. Forms as schemata

When a textbook on logic introduces the notion of logical form, it usually starts from the concept of schema. Many correct arguments, so the story goes, have the property that some of the expressions that are their parts can be replaced by other expressions without causing the argument to become invalid. Thus in the correct argument

(1) *Aristotle is human*
Every human is mortal
Aristotle is mortal

we can replace *Aristotle* with *Hegel*, *human* with *elephant* and *mortal* with *carnivore*, and it remains valid. This means that the general schema

(1*) *A is B*
Every B is C
A is C

is instantiated by only correct arguments. We will call such a schema *valid* and call the schematic letters we use to articulate it *parameters*. We will also say that the words that are replaced by the parameters are *abstracted away*. In modern logic, moreover, it is usual to regiment the structure of sentences and arguments and to replace their logically most basic constituents by *constants* – which I will also call *regimentation*. The resulting schema, then, may look as follows

(1**) $B(A)$
 $\forall x(B(x) \rightarrow C(x))$
 $C(A)$

A specific kind of such schema originates from dividing expressions into logical and extralogical, abstracting away the extralogical ones and regimenting the logical ones. The resulting schema is usually called the *logical form* of the expression, and the process of arriving at it is called the *formalization* of the argument. An argument with a valid logical form is then called *logically correct*.

This rather transparent explication of logical form is based on what Dutilh Novaes (2012) calls "logical hylomorphism as we know it". It renders logical forms as parasitic upon grammatical forms; indeed in the simplest case the logical form of an expression is just its grammatical form with (regimented) logical words left in place. But therefore this clearly cannot be the whole story regarding logical forms as they appear in the history of logic; as one of the historical sources of the concept of logical form was precisely the situation where we conclude that logical form may be substantially *different* from surface form.

3. Logical analysis

The importance of the role of logical forms within the history of analytic philosophy derives directly from the arguments to the effect that grammatical form is inadequate as a full guide

to meaning - that we need *another* kind of form more suitable for the purpose. Russell (1905)'s celebrated *On denoting* is a case in point: there Russell takes pains to show that unless we realize that a sentence such as

(2) *The king of France is bald*

does not have the form it seems to have (*viz.* a subject-predicate one, $P(a)$), but rather a very different one

(2*) $\exists x (P(x) \wedge Q(x) \wedge \forall y (P(y) \rightarrow (x = y)))$,

we cannot truly understand it.

Seeking logical forms articulated as formulas of formal languages of logic has become the enterprise known as *logical analysis*, and it has been taken by many logicians and philosophers as the key to meanings and consequently to many philosophical (pseudo)problems⁴. Here, then, the concept of logical form plays the important role it does precisely because it is *not* parasitic on grammatical form - precisely because it differs from it, sometimes rather drastically. Thus it cannot be just the kind of schema indicated above. Therefore, either it must be a schema abstracted from something other than (2) itself, or it must be some alternative kind of form.

We could find an English sentence such that (2*) might seem to arise out of it, perhaps

(2') There is something that is a king of France, it is bald, and everything that is a king of France is identical with it?

But it is clear that (2*) is not a result of formalization of (2'), for (2') is, the other way around, the cumbersome result of transporting (2*) back into English. So perhaps (2*) is the result of the formalization of the transcription of (2) into a logical language, such as⁵

(2'') $\exists x (\mathbf{king-of-France}(x) \wedge \mathbf{bald}(x) \wedge \forall y (\mathbf{king-of-France}(y) \rightarrow (x = y)))$.

This is much more plausible. But why, we should ask, is (2'') the transcription of (2) into a language of logic? Russell does not give us any explicit answer, but we can assume that this is so because (2'') has the same (or similar) "logical properties" as (2). But there are many formulas that are logically equivalent with (2''), e.g.

(2''') $\neg \forall x ((\mathbf{king-of-France}(x) \wedge \mathbf{bald}(x)) \rightarrow \exists y (\mathbf{king-of-France}(y) \wedge \neg (x = y)))$,

so does (1) have many logical forms, or do all these formulas somehow amount to one and the same form?⁶

⁴ See Beaney (2007).

⁵ Note that while (2*) is part of a *formal* language (consisting of logical constants and parameters), (2'') is part of a *formalized* (fully interpreted) one (consisting of logical and extralogical constants). More about this distinction, see Peregrin & Svoboda (2017) and Peregrin (2020).

⁶ As I have shown elsewhere (Peregrin, 2010), if we allow ourselves a logical language flexible enough, such as that of lambda-categorical grammar, we can produce a formula that is equivalent to

4. Forms of propositions?

There is a common answer concerning the nature of logical form which many philosophers are likely to give: the logical form of a sentence is not a schema abstracted from the sentence (nor, for that matter, of any other sentence), it is the form of the *proposition* expressed by the sentence, of the sentence's *meaning*. So what, then, are propositions, and how do we get hold of their logical forms?

But here we see that logicians and philosophers are far from unanimous in their responses. Take one of the prominent ways the concept of proposition has been explained in recent decades: a proposition is a set of possible worlds (Copeland, 2002). Propositions of this kind have no structures capable of leading us to anything like (2'), they are tied to the sentences allegedly expressing them exclusively by their truth-conditions. True, some exponents of this "intensional" (i.e. possible worlds based) semantics have concluded (especially facing the conundrum of propositional attitudes) that we must upgrade the semantics to a "hyperintensional" one, where the propositions become structured in a way that is analogous to that in which sentences are (Cresswell, 1985; Lewis, 1972), but this is usually precisely because some parts or aspects of the grammatical structures of the sentences expressing them have been projected onto them.

We might also think about developing a theory of propositions as structured objects independent of language, and history has indeed provided us with various such attempts at this. Russell (1914; 1924), for example, within the framework of his logical atomism, developed a theory of facts as complex worldly objects, and we could reap a theory of propositions from this if we considered not only actual, but also potential facts (which was close to what Wittgenstein (1922), in the *Tractatus*, did in terms of his "Sachverhalte")⁷. Or consider the situation theory of Barwise & Perry (1983), which also leads to a self-contained theory of propositions that may have some kind of structure to be abstracted from them. Is this not a way of getting hold of some logical form of a sentence different from its grammatical form?

However, how do we inquire into a realm of propositions independent of language? By a psychological investigation of the human mind or a neurological investigation of the human brain? Or by a "metaphysical" investigation of some Platonic realm where propositions reside? I think that, as a matter of fact, no such investigations which bypass language are feasible. When we observe how philosophers reach their theories of propositions, we can see that their theories are not really independent of language. Indeed, such theories which do not rest on language in an explicit way do so at least implicitly. For how do we even arrive

(2'') and *does* have the subject/predicate form of (2). The point is that if we define ***bald**** $\equiv_{\text{Def.}} \lambda p.p(\mathbf{bald})$ and ***king-of-France**** $\equiv_{\text{Def.}} \lambda q.(\lambda p.(\exists x(p(x)\wedge\forall y(p(y)\rightarrow(x=y))\wedge q(x))))(\mathbf{king-of-France})$, we can rewrite (2'') equivalently as ***bald*(king-of-France*)***.

⁷ See Giaretta (1997) or Linsky (2002).

at the basic building blocks of such a theory, such as individuals, properties, relations etc.? We do not ask physicists about the structure of our world, we take the meanings and potential meanings of our phrases. And how do we recognize the proposition which is expressed by a given sentence? It would seem that in the case of such structured propositions (unlike the case of propositions as sets of possible worlds) it would not be possible other than by considering some kind of structural similarity: we would likely assume that the proposition expressed by the sentence *John loves Mary* would be along the lines of a complex of two individuals, John and Mary, tied together by the relation of loving. Thus, it would seem that the kind of structure usable for logical form is likely to be closely related to the structure of the corresponding sentence. Hence this enterprise will be practically indistinguishable from searching for a formula of an artificial language that is the logical analysis of the sentence.

5. Expressing logical properties

All in all, it seems that we do not quite *discover* logical forms, at least not by ways bypassing language. Rather we create artificial languages and present logical forms as formulas of these languages, formulas that are more or less derived from the sentences of which they are the forms. Hence, instead of discovering logical forms, we seem to *create* them. And given this, the question arises as to why we do so – what do we create them for?

The answer I want to offer is that we create them to make the logical properties of the corresponding sentences explicit and available in a form in which we can easily manipulate them within various calculi⁸. Hence the view is that we do not uncover the logical form of a sentence to learn about its logical properties, we manufacture the logical form to make the logical properties open to view. Let us call this an *expressivist* conception of logical form.

Of course, the next question we face is how do we learn the logical properties, if not from the logical form? But the solution, as I see it, is straightforward: we learned them back when we learned the language, because they are part and parcel of semantics. The complication is only that we learned them mostly in the mode of "know-how", and this is precisely why we later have need of a logical analysis: we need to make our implicit knowledge explicit and available to critical reflection.

Which logical properties are supposed to be made explicit by articulating logical forms? There appear to be two general kinds of candidates: properties related to truth (typically truth conditions) and properties related to inference (inferential roles). We argued (Peregrin & Svoboda, 2013; Peregrin & Svoboda, 2017) that it is the latter that are more fundamental; but a lot of their explications can be considered as also explicating the former.

According to the picture laid out by Peregrin & Svoboda (2017), the primary data the logical analyst works with concern the correctness of arguments in the language to be analyzed,

⁸ As Brun (2020) correctly points out, the point of logical formalization is not *only* to make logical properties explicit, but also to gain tools for criticising our actual argumentative practices.

arguments like (1). All the correct arguments add up to the relation of inference that structures the language in question into what we termed an "inferential landscape", which the analyst is to map. The outcome of the mapping is usually a formalized language whose formulas are designed in such a way that they wear their inferential properties, as it were, on their sleeves. Given this kind of map, the logical analysis of a given sentence consists in finding the corresponding formula which elucidates its position on the map and hence its inferential properties.

Now if logical forms are not definite entities which we discover, but rather our creations, we urgently need such criteria for the assessment of appropriateness of the forms – otherwise we would be able to create them wholly willfully and the whole enterprise would lose any point. Such criteria, unfortunately and rather surprisingly, are hard to find in the literature (with the notable exception of Brun (2003)). The above picture leads us to the following general criterion⁹:

The logical analysis of a given sentence in a given formal (or formalized) language is a formula whose position within the inferential structure of its language most closely corresponds to that of the sentence within the inferential structure of its one.

6. Logical form as a hidden key to logical properties

There are two fundamentally distinct conceptions of logical form; they are so distinct that the term "logical form" can be ambiguous. According to one of these, a logical form is a distinctive *thing*, which gets linked with a sentence and which we must discover in order to reveal the logical properties of the sentence. (It resides either within the objective world or in the minds/brains of the speakers of the language to which the formula belongs and its being linked to the sentence is part and parcel of the sentence becoming meaningful.)

Consider the standpoint of Russell, who was the mainspring for the concept of logical form moving to the central place it now maintains in discussions about logic and semantics of language. Russell held that facts are worldly objects, which have their forms – *viz.* ways in which their components are arranged - as a matter of fact. Propositions, then, are tantamount to potential facts, their forms, again, being a matter-of-factual entity. According to this view, logical form may be said to be out there in the world.

As an example of a contemporary defender of this kind of view we can take Sher (2011), who claims that "logic is grounded in *formal or structural laws* governing the world—laws governing the *formal (structural) features of objects*, or their *formal behavior*" and that "logical form represents the formal structure of whatever given sentences claim to be the case." Or consider the standpoint of Chomsky and his followers, according to whom logical form is a level of representation of language within the mind/brain (Higginbotham, 1993; May, 1999). According to this, a logical form is located somewhere in the brain – it is a

⁹ Peregrin & Svoboda (2017) develop this idea in greater detail.

matter of a structure that would be detectable, at least in principle, by neurological methods.

In his recent book, Jaona (2018), for example, characterizes what he calls "the old conception of logical form" and "the current conception of logical form", and both characterizations are based on the assumption that "logical properties depend on logical form". This, then, is precisely the conception according to which logical forms are the keys to logical properties in the sense that we must discover the former to find out about the latter. But in my view, it is the other way around: the logical form depends on the logical properties, it is these logical properties on which the form depends in making them explicit. And indeed, many current theoreticians still do endorse this conception – *viz.* that we discover the logical properties of sentences as a result of discovering their logical forms; but there is no longer a general consensus on this.

7. Logical form as a means of making logical properties explicit

According to the alternative conception of logical form put forward here, logical forms are the tools of us, theoreticians. They express the outcomes of our research into the logical properties of sentences, in such a shape that they are open to view; and are easy to "calculate" with.

It is not the case that this conception is quite novel or unorthodox. It too has a relatively long and venerable tradition, fostered especially by such philosophers as Quine and Davidson. Davidson (1970), p. 140, for example, characterizes logical forms: "To give the logical form of a sentence is to give its logical location in the totality of sentences, to describe it in a way that explicitly determines what sentences it entails and what sentences it is entailed by."

This is the very kind of expressivism we urge: There is an "inferential landscape" with which we become familiar when we first learn language, and giving a logical form of a sentence is pointing out the position of the sentence within this landscape; for to point out the position is to pinpoint its (inferential) neighborhood – *viz.* stating "what sentences it entails and what sentences it is entailed by." Hence it is not so that we must discover the forms to be able to construct the landscape. On the contrary, we construct the forms to show us explicitly where the sentence is situated on the landscape, the landscape with which we are already familiar.

Similarly Quine (1980), p. 21: "What we call logical form is what grammatical form becomes when grammar is revised so as to make for efficient general methods of exploring the interdependence of sentences in respect of their truth values." It is obvious that according to this view logical forms are *our* creations: *we* create them if we want to envisage the "interdependence of sentences in respect of their truth values" - if we did not want to get clear about this, no logical forms would come into existence.

One of the aphorism-like statements from Wittgenstein (1953)'s *Philosophical Investigations* says (§126): "Philosophy simply puts everything before us, and neither explains nor deduces anything.—Since everything lies open to view there is nothing to explain. For what is hidden, for example, is of no interest to us". This illustrates the position w.r.t. logical forms urged

here surprisingly well. We are familiar with the inferential landscape of our language: indeed, we *understand* the language and knowing the landscape is part and parcel of the understanding. And Wittgenstein also says (§122): "A main source of our failure to understand is that we do not *command a clear view* of the use of our words. [...] A perspicuous presentation produces just that understanding which consists in 'seeing connections'. [...] The concept of a perspicuous presentation is of fundamental significance for us. It earmarks the form of account we give, the way we look at things. [...]" And indeed, giving the logical form of an expression is precisely giving this kind of perspicuous representation: we present what we already know to "*command a clear view* of the use of our words", in particular of the inferential structure of language.

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