Jaroslav Peregrin◉
Vladimír Svoboda◉

Establishing Logical Forms
What is assigned to what, how and why

Abstract. The paper presents a demarcation of a "minimalistic" concept of logical form, which nevertheless largely agrees with the way the term "logical form" is commonly used in contemporary logic and philosophy of logic. We see logical forms as formulas of formal languages assigned to (compounds of) sentences of a natural language (perhaps modulo notational variance). We thus reject the views of logical forms as underlying structures of thoughts or of the material reality that surrounds us. The assignment of the forms, we claim, aims at envisaging the logical (especially inferential) properties of the analyzed sentences, arguments, or other texts, as the analyzing formulas wear them, as it were, on their sleeves. Hence we suggest an "expressivist" and a pragmatic understanding of logical forms - they are used to expose (and fix) logical properties of sentences in textual contexts and the way of their employment is determined by the goals of the particular studies.

Keywords: logical form; nature of logic; logical analysis; reflective equilibrium

1. Logical analysis

This paper seeks to present a demarcation of the concept of logical form that agrees as much as possible with the common use of the term "logical form" in contemporary logic and philosophy of logic, while at the same time remaining free from any metaphysical encumbrance. This aspiration seems modest, perhaps too modest, but if we survey the relevant literature we will notice that the term in question is not at all used in a uniform way. In many philosophical treatises the talk about logical

forms is indeterminate or even somewhat enigmatic. Alas, its content is often not so clear even in texts where the term is used as a basic building block of logical terminology.[1]

By no means do we want to claim that the delineation of the concept we propose is the only correct one, or that it is in some way ground-breaking. We believe that many logicians in fact do use the term "logical form" in the way that we strive to specify as clearly as possible, but they often do it without an explicit reflection. In any case, systematic studies aspiring to provide a plausible down-to-earth elucidation of the concept — which might then aspire to become "common currency" among logicians (and especially those who are naturalistically oriented) — are surprisingly short in supply.[2]

The main reason for this, in our view, is the fact that the concept of logical form is so closely intertwined with other central concepts of logical theory that we can't really get a satisfactory grasp on it unless we also illuminate a number of other central logical concepts, and this turns the endeavor into an intimidatingly ambitious project. Thus, an important, perhaps even crucial, part of our present considerations will consist of navigating through the archipelago of fundamental logical concepts that often seem quite clear at first sight, but attempts to elucidate them may open a Pandora's box of heated debates and startling disagreements.

Before entering the debate on conceptual issues it will be useful to make a brief historical digression. We can surely say that the first philosopher who turned his attention to logical forms — though he did not, understandably, talk about them in the terms that are common now — was Aristotle. A lot of what he says in his logical works concerns precisely these forms. Among the subsequent philosophers and logicians who developed the heritage of Aristotle's *Organon* in ancient, medieval and early modern times, the phenomenon of logical form was also important, but at the same time the adjective "logical" was ordinarily used much more broadly than is typical of present-day texts.

Bernard Bolzano paid attention to logical forms (as we understand the term in modern logic) in his *Wissenschaftslehre* (1837), but his work didn't have much impact. George Boole — the author of the first logi-

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[1] Iacona (2016), for example, documents that contemporary debates vacillate between at least two incompatible accounts of the concept of logical form.

[2] Which, of course, is not to say that the concept is not paid any attention at all (see, e.g., Blau, 1978; Brun, 2003, 2008; Iacona, 2018; Preyer and Peter, 2002).

cal language in the modern sense — provided a means for their symbolic representation. Several decades later, Frege's *Begriffsschrift* (1979) provided us with the first comprehensive logical language in the modern sense and in this way opened up space for a truly interesting debate on logical forms.

The term "logical form" itself was introduced into the modern debate by Bertrand Russell. In his paper *On Denoting* (1905), Russell, making use of Frege's invention, contrasted the surface (grammatical) form of English sentences with their not so clearly recognizable logical form.[3] After that, the concept of logical form played the central role in his project of analyzing natural language — a project that aimed at promoting reasoning to a new level.

Unfortunately Russell, as it seems now, somewhat encumbered the term with needless connotations and his use of it allowed for very different interpretations of the gist of the concept. To appreciate the nature of Russell's struggle let us take a brief look at what Russell was after in his celebrated paper, which is often considered as the *locus classicus* of logical analysis. Russell (1905, p. 488) writes:

> If I say "Scott was a man," that is a statement of the form "x was a man," and it has "Scott" for its subject. But if I say "the author of Waverley was a man," that is not a statement of the form "x was a man," and does not have "the author of Waverley" for its subject. Abbreviating the statement made at the beginning of this article, we may put, in place of "the author of Waverley was a man," the following: "One and only one entity wrote Waverley, and that one was a man".

In this passage, Russell presents a particular problem which arises in connection with the contents of sentences whose subjects are *definite descriptions*, i.e. English phrases formed by means of the definite article and purporting to refer to a single object. Russell provides his well-known analysis with the conclusion that, from the logical perspective, sentences like "The author of Waverley was a man" have the logical form of an existential statement. Russell's insight, though many times challenged,[4] is still very much approved of by the bulk of logicians.

Pietroski (2021) in his standard-setting text generalizes Russell's approach in this way:

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[3] Russell (1905) does not yet use the term "logical form". It starts to appear in his later writings (Russell, 1919b) where it is, however, often ascribed to *facts*.

[4] Most famous is the attack by Strawson (1950).

On his [Russell's] view, "The boy sang" has the following logical form:

$$\exists x\{\text{Boy}(x) \land \forall y[\text{Boy}(y) \rightarrow y = x] \land \text{S}(x)\};$$

some individual$_x$ is such that he$_x$ is a boy, and every (relevant) individual$_y$ is such that if he$_y$ is a boy, then he$_y$ is identical with him$_x$, and he$_x$ sang. The awkward middle conjunct was just Russell's way of expressing uniqueness with Fregean tools; [...] But rewriting the middle conjunct would not affect Russell's technical point, which is that 'the boy' does not correspond to any constituent of the formalism. This reflects Russell's main claim: while a speaker may refer to a certain boy in saying 'The boy sang', that boy is in no sense a constituent of the proposition indicated. According to Russell, the proposition has the form of an existential quantification with a bound variable.

It seems that here the logical form is assigned to a sentence of natural language ("The author of Waverley was a man", "The boy sang") and it is (expressed by) a sentence of an artificial logical language. Where does the form come from? Pietroski (2021) writes:

Many philosophers have been especially interested in the possibility that grammar *masks* the underlying structure of thought, perhaps in ways that invite mistaken views about how ordinary language is related to cognition and the world we talk about.

Hence, the form of a sentence brought to light is that of the "thought" which "underlies" the sentence. It might seem, then, that logical analysis is, first and foremost, a matter of a kind of (pseudo-)psychological investigation of the kinds of thoughts we can have, complemented by an investigation of the ways our sentences can represent the thoughts.

In this paper, we offer an alternative picture that we contrapose to the Russellian one based on analysis of the objectively given content of thoughts: logical form is not something to be excavated from "beneath" or "behind" a sentence. It is not an inherent structure of a thought or proposition expressed by it; it is rather an expression of the position of the sentence within the core inferential structure of the text to which the sentence belongs, made explicit by means of an artificial language.[5] It is thus not independent of the logical form of other sentences forming the text in question (if, of course, the text doesn't consist of a single sentence) and of the purpose to which the identification of the position serves.

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[5] Later it will become clear that we do not mean that the relevant inferential structure and the positions within it are something definite, wholly independent of our theories.

2. Disambiguations

As we have suggested, we can hardly provide a fully comprehensible answer to the question *What are logical forms?* and, in our view, closely related question *What are logical forms good for?*, if we do not have a (relatively) clear idea how to answer the question *What is logic?* and also the related question *What is logic good for?* Perhaps the most common answer to the first question is (something like): "Logic is the study of correct reasoning". This answer suggests that we might specify logical forms as *forms of correct reasoning*, but such specification seems, from our perspective, too elusive to serve as a promising start on the path towards gaining a grasp on the concept of logical form.

We thus propose a different strategy. We suggest that in order to proceed towards a more informative answer, we need to begin with a disambiguation of the term "logic" as it is used in the relevant literature on logic and the philosophy of logic.[6] We insist that if we wish to assure that our talk about logic will be unequivocal, we must systematically distinguish three senses of the term:

(1) the name of a *phenomenon we construct theories of, resp. we anchor our (logical) theories in* – **logic^{Ph}**
(2) the name of a (scientific?) *discipline producing the specific theories* – **logic^{Di}**
(3) the general name of the *individual theories (or systems, or apparati, . . .) produced by the discipline* – **logicTh**

The textbook answer we mentioned concerns **logic^{Di}**. Though we can accept the answer, the step still leaves space for quite diverging views about the nature of logic as a phenomenon (if we concede that a phenomenon of this kind exists). This indicates that the core of the controversy can be articulated by a question that we can, employing our disambiguation, expressed as *What is* **logic^{Ph}**?, i.e. where should we search for the phenomenon that our theories (**logicsTh**) are meant to capture, resp. where the theories are anchored? Let us briefly outline the possible answers.

One possible answer is that **logic^{Ph}** concerns "pure" thought. Many philosophers suppose (and even more used to suppose) that pure thought is independent of the natural world, and that overt reasoning, whose

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[6] We have also discussed some of these distinctions in our recent papers (Peregrin and Svoboda, 2021, 2022).

vehicle is a natural language, must be underlain by thoughts or ideas of this kind. If we simplify, we can say that they endorse the kind of picture famously outlined by Plato and thus we can call them Platonists. **Logic^{Ph}** then can be identified as a complex of super-natural laws governing reasoning as an effective movement in such a world of ideas and thus governing any rational deliberation as such. Adherents of this view attempting to get a grasp on **logic^{Ph}** strive to become "geographers" of the supernatural realm.[7] Of course, the methodology of such an endeavor is a delicate matter.

An alternative, more down-to-earth version of the approach that situates **logic^{Ph}** into thought, does not stipulate anything like a grand objective world of ideas. Philosophers adhering to this more modest conception focus their attention on the thought with which we are all familiar — on *human* thought. Here our overt language is again considered as underlain by a covert realm of meanings, but now they are usually not called ideas but rather *concepts* and are supposed to reside in the human mind. This system of concepts — which is perhaps somehow wired into human brains — can be (and is) called *the language of thought* (LOT) (see Fodor, 1975, 2008). We can then speculate that LOT exhibits a kind of natural inferential structure which can be identified as *a* or *the (natural)* **logic^{Ph}**.

Even if our brain employs the LOT, it may, as we all know, fail to reason in accordance with the principles guiding the proper working of thought, but when we aspire to be rational we should reveal the principles, fix them by means of our theories, and (ideally) follow them when we need to think clearly and reliably. If we adopt a version of this picture it is likely that the prominent method of getting a grip on **logic^{Ph}** will be introspection or, in recent times, perhaps some methods provided by neuroscience.

Another, perhaps less common, answer to the question concerning the nature of **logic^{Ph}** is that it resides in the material world (and then perhaps, secondarily, in our thought) — that is, in the way the material world is organized. This picture, which can be ascribed to Russell (for whom the difference between logic and natural science is only the greater generality of the former) (see Russell, 1919a) presupposes that the material world has, besides its physical structure(s), also a logical one (see,

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[7] Historically, see, e.g., (Boole, 1854); in a modern context, see, e.g., (Leech, 2015).

e.g., Maddy, 2014; Sher, 2011). Perhaps such a structure might duly be called "onto-logical" (and we can speak about the onto-logical account of **logic$^{\text{Ph}}$**).[8]

The view we want to promote here (without any claim for originality) is not in any direct fundamental conflict with any of the accounts of the nature of **logic$^{\text{Ph}}$** that we have just mentioned. We suggest that **logic$^{\text{Ph}}$** is most conspicuously present in the basic vehicles of communication that we all employ — in natural languages. (To be frank, we should openly say that we, indeed, maintain that there is no higher, deeper or firmer logical reality than the somewhat precarious and elusive one that can be tracked down when we focus on our linguistic practices an account of **logic$^{\text{Ph}}$** that might then be called "linguistic". However, nothing on which we want to build in this paper hinges on this conviction of ours.) Thus, we are in the same boat with all those who agree that natural languages as we know them exhibit a certain (though perhaps not determinate, accurate and definite) inferential and specifically logical structures (for some scholars perhaps as an imprint of some more fundamental structure) and who also agree that the logic can be discerned in our linguistic practices (as their constitutive feature), i.e. that we should take the **logics$^{\text{Ph}}$** inherent to our languages seriously while doing **logic$^{\text{Di}}$**.

To summarize: we hold that **logic$^{\text{Ph}}$** resides in our natural languages. Logical principles (that are not strict and exceptionless) govern our argumentative practices and are thus imprinted into our natural languages. The obvious fact on which we build is that sentences of natural languages are interconnected by a number of logical relations such as (a specific kind of) incompatibility or (a specific kind of) inference. This allows us to talk about logical issues without the need for any far-reaching speculations and to conceive our study in a methodologically down-to-earth manner.[9]

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[8] We should confess that we do not see in which sense the natural world — objects like planets, rocks or trees — might exhibit forms different from those that are ascribed to them by physics and that would deserve to be called logical, but we are not going to discuss this here.

[9] We presume that some people will see this picture as superficial as we do not explain *why* natural languages exhibit the logical structure that they do exhibit. Later, we hint at an explanation as to why we have the logical vocabulary we have (as a means of making our rules explicit), but in general we see such questions as being in a way analogous to questions like *Why did most dinosaurs have four legs?* We do not think that we should insist that zoologists give us a more substantive answer than

In connection with the phrases "a specific kind of" used above (in brackets), we should also clarify what is supposed to be, in our view, *the scope* of **logic^{Di}**, for also here there are at least two popular possibilities. On the *broad conception of the scope of logic*, logic comprises *all* relations of incompatibility and inference in a natural language (i.e. cases where a couple of sentences can never be all true, or can never be all true without another sentence being also true). On the *narrow conception*, it comprises only *some* of those relations, namely those that are a matter of terms like *and, or, if . . . then, all, some* (in English) or their stylistic variants (or perhaps also by a more inclusive group of terms, including such as *possibly, necessarily, it is known that, . . . believes that, . . . ought to see to it that*, etc.) We call words and phrases of this sort (in agreement with a widespread convention) *logical vocabulary* and we are ready to concede that the borderline between logical and extralogical vocabulary is fuzzy.[10]

From what we have said it should be clear that the correctness of the argument

$$\frac{\textit{Fido is a dog}}{\textit{Fido is a mammal}}$$

is a matter of **logic^{Ph}** on the broad, but not on the narrow conception of logic; whereas the correctness of the argument

$$\frac{\textit{Fido is a dog}}{\textit{Every dog is a mammal}}{\textit{Fido is a mammal}}$$

is a matter of **logic^{Ph}** also on its narrow conception. (Its correctness is independent of the meaning of *dog* and *mammal*.)

Now we come to the last of the three uses of the term "logic" we propose to distinguish — **logicTh**. This use of the term is actually the most common one, especially in texts in journals devoted to publishing results of current research in **logic^{Di}**. Since the time when Frege's results received full appreciation and took the shape that is nowadays standard,

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something like *Because it turned out to be in some way advantageous given their and their predecessors' living conditions.*

[10] Logical vocabulary can be loosely delimited as the collection of such words and expressions that are (i) topic-neutral (i.e. not restricted to any particular discourse, but permeating all of them) and (ii) essential for argumentation. There is, needless to say, a great leeway.

we can see logical theories as consisting of two components: a) an artificial language (in a constricted sense) defining what is a well-formed sentence or formula of the language in question,[11] b) a system of rules that determines a relation of (logical) inference among the sentences. (Tarski (1936, 1956) then added a possible third component — formal semantics (see Peregrin, 2020).)

Of course, not *every* bundle of rules and *every* delimitation of (an alleged) inference relation is reasonably called a *logic*. To deserve the title, a system must be related to our *de facto* reasoning and hence to a natural language, which is its natural vehicle. Hence a **logicTh**, in the typical case, is a kind of "model" of the logical structure of a natural language (and insofar as we assume that the structure is plus/minus the same across natural languages, it is a "model" of the general structure). Modern logical literature abounds with logical theories — **logicsTh** — and, unsurprisingly, not all of them deserve the title to the same extent. Some theories, central to the enterprise of **logic^{Di}**, may be seen as logical without any doubts, while in some other cases the status may be disputable. And again, we shouldn't expect that there is a sharp borderline between theories that deserve to be classified as logical and those that do not.

Now we are ultimately reaching the point at which we have to address the question that we announced above: *What is logic good for?* Given the disambiguation presented above, we must distinguish three versions of the question:

(i) *What is* **logic^{Ph}** *good for?*
(ii) *What is* **logic^{Di}** *good for?*
(iii) *What are* **logicsTh** *good for?*

The first of the questions may not seem to make much sense. If you hold that **logic^{Ph}** is made up of some structures of reality or of pure thought independent of humans, the question what is it good for seems inappropriate. However, if you believe, as we do, that **logic^{Ph}** is a matter of the logical vocabularies of natural languages and the rules governing them,

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[11] The term "language" is often used in two different senses — in the first of them, a language is just a set of primitive symbols and formation rules (here we can speak about *bare language*), while in the second sense a language also includes the interpretation of at least its logical symbols (we can refer to such languages as *interpreted languages*). In our writings (Peregrin and Svoboda, 2017), we further divide the interpreted languages into *formal* (with interpreted logical constants and uninterpreted parameters) and *formalized* (with interpreted logical and extralogical constants).

it makes sense. The question why our natural languages contain logical vocabulary may be capable of being answered. One possible answer, the one we would subscribe to, is *expressivism*, *viz.* the view that the function of the logical vocabulary is making the non-logical inferences (they are usually called material) explicit. But this would be a topic for another paper (see Brandom, 2000; Peregrin, 2014, Chapter 9; Brun, 2019).

As for the second version of the question, we have already mentioned the textbook answer: Logic develops theories of correct reasoning. Of course, the views of how to produce such a theory will differ according to the views of the nature of **logic**^{Ph}. If you hold that **logic**^{Ph} is in the human-independent world, then you are likely to see **logic**^{Di} as something similar to a natural science discovering some kind of laws analogous to the natural ones. In this connection, we have an axe to grind as the outlined accounts of the purpose of logic are difficult to defend if one is not ready to say that most of logics (theories that are nowadays presented and widely accepted as logical) in fact are *not* true logical theories, as it is quite implausible to admit that reality as such or thought as such would be (at the same time) governed by laws that are so varied.

But once again we suppose that we can find common ground with those who view the primary aim of logic differently as they are unlikely to deny that logic has also a practical role, which revolves around finding the criterion of correctness of arguments (and of their specific variety — proofs). So even if they are convinced that logic concerns the buildup of the material world or of pure thought, they are likely to concede that their enterprise has (also) a practical purpose. And what holds for logic in general, holds for its tools, like logical forms: their revealing and ascribing to sentences and arguments has a practical purpose. Thus, they are likely to find the questions like *How can we profit from revealing logical forms?* or, more generally, *What is* **logic**^{Di} *good for?*, or *In what ways are individual* **logics**Th *useful (if at all)?* worth being answered.

No doubt there is a huge disagreement between those for whom recognizing laws of logic is akin to recognizing natural laws and those (like us) who tend to see them as — if we put it somewhat provocatively — akin to man-made rules, like rules of traffic: rules that are far from haphazard but still are to some extent a matter of convention. Nevertheless, at least the practical aspect of logic, we believe, should provide for an intersection — for some commonly shared criteria for deciding which formal theories deserve to be called **logics**Th and which do not, as well as

concerning deciding whether logic A is preferable to logic B or not (if, of course, the logics have the same or a similar scope).

And we do believe that some such common ground exists and that logicians holding quite disparate views about the nature of logical forms do not speak entirely past each other when discussing the merits and vices of individual theories or their systems — logical theories in a broader sense of the word. Perhaps the differences in assessment have often more to do with what a logician finds interesting and important than with her (often not fully reflected) views of the nature of logical forms and laws.

We thus suggest that even though there is little chance that logicians will ever reach an agreement on an answer to the question *What is the nature of logical forms?*, there is a better chance that they might reach a (perhaps flimsy and relative) agreement as to the proper answer to the question *What are logical forms good for?* or *For which purposes do we employ (representations of) logical forms?*

3. Logic as the science of argumentation

Now, after this somewhat long introduction, we are getting to the issues that are our central topic. First, we will address a question that shouldn't be too controversial, namely the question to what kind of entities we primarily assign logical forms. As we have argued, independently of which account of the nature of logic one prefers, logicians are very likely to agree that the ascribing of logical forms should help us decide which arguments are *correct* (or *valid*[12]).

Let us in this connection note that, as a matter of fact, only a few logicians explicitly deal with the correctness of argumentation. More typically, they study different aspects of abstract idealized models and solve their internal problems, i.e. the internal problems of **logics$^{\mathbf{Th}}$**.

We are afraid that the detachment of logical theorizing from dealing with actual problems that affect mutual understanding in various areas of communication (including a lack of consensus in the assessment of correctness of argumentation) has reached an extent which is somewhat unfortunate. But let us put aside this observation and suppose that most logicians would agree that **logic$^{\mathbf{Di}}$** should after all focus on argumentation

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[12] As a matter of terminological convention, we use the term "(in)valid" in connection with schemata of arguments and we classify individual arguments as "(in)correct".

as it can be encountered "in the wild". If we take this thesis seriously, it is worth reflecting on what is the precise nature of the arguments it studies — what do they consist of? It is clear that they have premises and conclusions, but what exactly are they? If we review the relevant literature, we are likely to conclude that there are four main possibilities — four kinds of accounts of arguments which are the focus of attention of logicians:

(1) (Standardized) arguments formulated in a *natural language*, e.g., English:

$$\frac{\begin{array}{c} \textit{Every dog is a mammal} \\ \textit{Fido is a dog} \end{array}}{\textit{Fido is a mammal}}$$

(2) Arguments formulated in a *hybrid language*, which mixes artificial logical expressions with natural language extralogical expressions (where *dog, mammal*, and *Fido* are English words):[13]

$$\frac{\begin{array}{c} \forall x(\textit{dog}(x) \rightarrow \textit{mammal}(x)) \\ \textit{dog}(\textit{Fido}) \end{array}}{\textit{mammal}(\textit{Fido})}$$

(3) Arguments formulated in an artificial *formalized language*, i.e. consisting of meaningful sentences of an exact artificial language, e.g., the language of arithmetic or that of Montague's intensional semantics (where *dog′*, *mammal′* and *Fido′* are names of certain functions[14]):

$$\frac{\begin{array}{c} \forall x(\textit{dog}'(x) \rightarrow \textit{mammal}'(x)) \\ \textit{dog}'(\textit{Fido}') \end{array}}{\textit{mammal}'(\textit{Fido})}$$

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[13] Such an argument may also be given in the shape of an argument formulated in a formal language (type 4 in our classification), plus a "correspondence scheme" that assigns concrete expressions to its parameters. In this way we might, for example, complement the argument form in (4) by the correspondence scheme: P ... (*is a*) *dog*, Q ... (*is a*) *mammal*, a ... *Fido*. Though such schemes are usually used for different purposes (e.g. for ensuring that the same expression will be represented by the same parameters throughout a formalization), it is naturally possible to read them as means of turning sentence forms into hybrid sentences.

[14] Terms like *dog′*, can, e.g., denote functions mapping possible worlds on sets of local dogs (thus *dog′*, unlike the English *dog*, is a constant of an artificial language).

(4) Arguments formulated in an artificial *formal language*, i.e. consisting of artificial logical constants and parameters standing for unspecific extralogical expressions. Thus they are, in effect, argument *forms* (though logicians commonly use the term "argument" while talking about them):

$$\forall x(P(x) \to Q(x))$$
$$\frac{P(a)}{Q(a)}$$

These four kinds of arguments are frequently encountered in logical textbooks as well as in research articles or books. It is perhaps worth noticing that talk about arguments is often indirect. Many logicians prefer to talk about (logically) true, resp. logically valid sentences or formulas instead of valid arguments. This is fair enough if it doesn't lead to the conviction that the main task of logic is to identify different kinds of tautologies. A conviction of this sort can, in our view, easily lead one astray, namely to engaging with problems that are marginal from the perspective of the purport of logic.[15]

Having considered these four cases, have we really exhausted all the possible meanings which the term "argument" covers? Not really. There are at least three other cases to be mentioned. We may also want to consider arguments that are "hidden" in written texts or oral communication in the sense that they are intermingled with other, non-argumentative components. If logic is meant to help us decide whether the relevant argumentation is (logically) correct or not we face a task that may be quite complex — to extract what we called *standardized arguments* from the texts or conversations in which they are buried. In the logical community, there is no explicit agreement as to whether this task belongs to logicians or not (perhaps it belongs to specialized linguists, semanticists or specialists in rhetoric?).[16] We do not mean to deal with these complex issues here — they are a topic for a different article.

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[15] It is not so important whether, for example, the sentence *If he is either stupid or pretends to be, and he is not stupid, then he pretends to be stupid* is (patently) true, but whether proceeding from the premises *He is either stupid or pretends to be* and *He is not stupid* to the conclusion *He pretends that he is stupid* is a correct step.

[16] If we distinguish between (formal) logic and informal logic, then it is obvious that "informal logicians" are more likely to be willing to adopt the task. Still, a number of logicians are, we are afraid, inclined not to view scholars working in the area of informal logic as "true" logicians.

The other case that we have (someone might complain) neglected are arguments that do not consist of *sentences* or *formulas*, but rather of *propositions*. This, however, makes us face the tricky question what exactly a *proposition* is. One possibility is that the term "proposition" simply means the same as "the meaning of a declarative sentence" (whatever it is). Another account which is perhaps more widespread is to see propositions as something more or less independent of sentences. The case in point is seeing propositions as *constant bearers of a truth value* (for which Frege used the term *Gedanke*, i.e. *thought*). Those who incline to this conception of propositions tend to view them as something that is only contingently expressed by sentences and that cannot be generally accessed via sentences.

We neglect this account of argument for a down-to-earth reason: if we want to study any argument of such a kind, we must articulate it in a public language, hence we cannot but study it via its linguistic proxy. Then the question is why we should see the linguistic proxy as a *proxy* and not as an argument itself. Because argumentation is not a matter of linguistic items but rather of their meanings? We are convinced that though it is certainly a matter of *meaningful* linguistic items, there is no reason to see the meanings as independent of their linguistic vehicles.[17] Or because we cannot therefore study arguments that cannot be articulated in any language? Well, we are afraid that such arguments cannot be studied anyway.

The last possible account of arguments that we might be said to neglect is based on taking arguments as consisting not of *sentences*, but rather of *utterances* — sentences embedded in concrete contexts. It is true that if we consider the non-technical use of the term "argument", then arguments often do consist of utterances (they contain indexicals and rely on information supplied by the context in other ways). We do not want to deny that insofar as logicians want to study argumentation "in the wild", they will have to deal with arguments of this kind. We just think that such arguments can be usually reformulated as (relatively) independent of context and thus focusing on arguments consisting of sentences (rather than utterances) is a tolerable simplification.

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[17] We, of course, do not mean to deny that sentences and arguments in one language usually have (more or less exact) counterparts in other languages and we can describe the situation so that we say that they "share meaning" or that it is "the same argument"; this, however, need not mean that there is an entity that is literally shared.

4. What is assigned to what . . .

Returning to the problem of logical form, the first question we face is *What are the objects to which we assign logical forms? What sort of objects are the form bearers*? Let's return to Russell and Pietroski. From Pietroski's entry in the perhaps most authoritative philosophical encyclopedia we learn that the *sentence* "The boy sang" has the following logical form: $\exists x\{Boy(x) \wedge \forall y[Boy(y) \rightarrow y = x] \wedge S(x)\}$. What is analyzed is a sentence of natural language, and what is used to analyze it is a sentence of a hybrid or formalized language.[18] Is this so?

We agree that sentences of natural language, and hence arguments of type (1), are the items the logical forms of which we usually strive to identify. After all, it can hardly be sentences of a formal language, *viz.* arguments of type (4), for those appear to *be* (manifest embodiments of) logical forms rather than something the logical forms of which we need to seek. And similarly for sentences of hybrid or formalized languages (arguments of types (2) and (3)) — the same logical form usually forms their backbone.

So far, so good; we take sentences of natural languages as logical form bearers. What do we assign to them? In Pietroski's case, it is a formula of a hybrid language, but it is clear that for him it is only a tool of picking up the structure of a "thought" expressed by the sentence. And here is where we part ways with him (and perhaps with a number of logicians). We do not think that the formula assigned to the sentence is an articulation of some structure present within the "thought" expressed by the sentence. We are convinced that the form can be identified directly with the formula

5. . . . why . . .

Why do we assign formulas of formal languages to sentences (or arguments)? The common parable, we think, is as follows: *Sentences (argu-*

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[18] Pietroski's example is quite simple and yet points out some interesting complexities of logical analysis. One point is that the analyzed sentence, as it stands, does not have any truth value. This indicates that it cannot be seen as expressing a proposition conceived as Fregean thought. The other point concerns the uniformity of logical analysis across natural languages. The analysis of the given example turns on the complexity introduced by the definite article — yet there are languages that lack articles. And if the sentence "The boy sang" is translated into such a language, say Latin, its natural and correct translation would be "Puer cantabat", whose most pertinent analysis would seem to be $\exists x\{Boy(x) \wedge S(x)\}$.

ments, texts) articulated in natural languages express thoughts. But as natural languages are often non-transparent, or even somewhat messy, it is not always obvious which thoughts the sentences express, in particular what their form is. (A sentence has its own "surface" structure, which often hides the important structure of the thought.) It is thus necessary to penetrate the veil of the sentence to find the underlying thought — and it is the logical analysis that shows us the way.

We think the aim of logical analysis is very different. A rudimentary logical analysis is any attempt aiming at making explicit the inferential properties of a given sentence — an attempt at determining what the sentence is inferable from and what is inferable from it. This process makes the sentence and the arguments it is a part of liable to reflection or criticism that helps foster mutual understanding. We label this view as *expressivism about logical forms.* From the expressivist viewpoint logical forms are not *discovered*, but rather *posited* by us in the course of (in the rudimentary natural case often interactive) logical analyzing. Logical forms thus are tools of our theories. And their ascription is, in the typical case, relative to the goals with which we carry out an analysis.

If we view formal languages as *models* of the natural one (a stance that we recommend (see Peregrin, 2021, forthcoming)), then the situation becomes relatively transparent. Formal (or, for that matter, hybrid or formalized) languages differ from the natural ones in that their formulas wear, as it were, their crucial inferential properties on their sleeves[19]. The inferential structure of these languages is thus largely perspicuous. This, of course, does not mean that it would *always* be easy (or even possible) to decide what is inferable from what. What makes the difference is that there is a clear methodology that ideally allows for deciding whether a certain sentence is inferable from another sentence or not.

As we see it, logical analysis amounts to using a formal language as a model of a natural one and pinpointing the counterpart of the analyzed sentence within the model. It is, of course, presupposed that many other sentences (at least those related with the analyzed one by the relation of inference) have their counterparts within the model. The point of having a model is that the relations of inference become more transparent; as we already pointed out, the formulas wear their inferential properties on their sleeves. But we must keep in mind that we might be interested in

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[19] This is not to say that they are completely transparent: we do not, for example, see whether a formula of the classical predicate logic is a theorem.

various aspects of the inferential structure and consequently build various models.[20] Anyway, it is the pinpointing of the formula corresponding to the sentence that amounts to the identification of its logical form. And we insist that *logical forms are nothing above or beyond the formulas of formal languages* and in this sense logical forms are our — i.e. logicians' — invention. We invented them (and keep inventing them) to reach a better understanding of our natural languages and a better understanding of each other — a common agreement on what texts convey.

It is not surprising that logical forms as we today know them originated from the need to secure clarity and mutual understanding in an area where clarity is of the utmost importance — in mathematics. But also in other areas in which a higher level of clarity and certainty is required we can profit from ascribing logical formulas (as logical forms) to sentences and especially their compounds — arguments or, more generally, texts. Logical analysis can be a useful tool also in "softer" areas of science or even in everyday communication. It would be too optimistic to expect that logical analysis will definitely clarify what all texts or oral intercourses we come across say and what they fail to say (what is inferable from them and what they are inferable from). In some cases, the parties that use logical analysis to sort out their disagreement won't reach an agreement (it is futile to presume that there is an ultimate truth concerning the meaning of natural language expressions), but identifying the source of the disagreement and understanding what our partners in discussion mean by what they say can also be extremely valuable.

6. ... and how

From what we have said it is obvious that there is no clear, universally adopted methodology that we could follow when building logical languages — the logical form providing tools. There is also no reliable method for determining which logical form (a formula of a logical language) is to be ascribed to a certain given argument or an individual sentence.[21] We have discussed the criteria of adequacy of assigning log-

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[20] We may, for example, prefer a "shallow" analysis to a "deeper" one, and employ propositional logic as the analytic tool rather than the predicate one.

[21] In (Peregrin and Svoboda, 2017), we explain that we can address the ascribing problem on two levels, resp. in two settings — *external* and *internal*. If we wish to decide which formula of a given language is the most adequate logical form of a

ical forms (formulas of formal languages) to sentences in (Peregrin and Svoboda, 2017). We are convinced that we identify the adequate (i.e. the relatively most adequate) logical forms of sentences in a process akin to what Rawls (1955) called, in the context of ethics, *reflective equilibrium.* The point is that we formulate general hypotheses concerning the logical properties of sentences on the basis of particular data regarding which arguments are, as a matter of fact, held correct by the bulk of relevant speakers, and then reconsider the data in the light of the generalizations (or, as the case may be, amend the generalizations in the light of new data).

We argue that we should especially take into account four principles — *reliability*, *ambitiousness*, *transparency* and *parsimony.* First, our ascription must not have non-negotiable counterexamples — whenever our logical model stipulates a certain argument form as valid, then the instances that correspond to it should not be clearly incorrect. Second, as many as possible pre-theoretically correct arguments (belonging to the scope of current investigation) should come out, the other way around, as instances of forms valid according to our model. Third, the logical form ascribed to a given sentence should be at least as syntactically similar to the analyzed sentences as any logical form that satisfy the first two criteria to the same extent. Fourth, among the logical forms that satisfy to the same or comparable extent the three mentioned criteria, we should prefer the one that is as parsimonious with respect to the building blocks of the forms as possible. (The order of the last two guidelines might be reversed.)

Here we find it imperative to stress that assigning logical forms to sentences of natural languages is almost always part of analyzing larger wholes than single sentences — "texts", such as arguments. The logical analysis of (i.e. ascription of a form to) a text is based on assumptions concerning its coherence (it is, for example, assumed that, as a default, all occurrences of a proper name in a text refer to the same individual[22] and that all occurrences of words or phrases have the same meaning).

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certain sentence (in its textual context), we are dealing with an internal question. If we strive to decide which of the available languages is the best tool of its formalization (perhaps relative to a purpose), we are answering the external question (we approach the problem of ascribing a logical form from the external perspective).

[22] Of course, as a default — it may be clear from the text that more individuals bear the same name.

It is also important to point out that there is an interplay between the criteria of proper logical formalization and the process of deciding which formal language — a candidate for a logical language — is a suitable means of logical analysis. A formal language that forces us to accept, as the best available formalizations of a certain sentence, a formula whose ascribing forces us to disregard facts concerning the inferential properties of the sentence appears to be not fully adequate and if such cases are plentiful we will conclude that it does not deserve the status of a *logical* language. A formal language that allows for systematic formalizations that allow for classifying more correct inferences as logically valid is (other things being equal or comparable) preferable as our logical language. Principles of transparency and parsimony are to be projected on the process of selecting the formal languages that are to be accepted as our (preferred) logical theories in an analogous way. (The picture as presented here is simplified; for a more elaborated picture, see (Peregrin and Svoboda, 2017, Chapter 5).)

7. Conclusion

Though the conception that we have put forward accords, we believe, with the common practice of logicians occupied with tasks involving ascribing logical forms to sentences, arguments and texts, it has implications that many logicians may find hard to swallow. One such consequence is that there is no clear-cut borderline separating those theories that are logical in the sense that we can profit from viewing their formulas as logical forms from those which are non-logical. Logicality in a way becomes a matter of degree.

Another consequence is closely connected with this: If we claim that logical forms are nothing but formulas (perhaps *modulo* notational variance) of a logical language and that there is no clear borderline between formal languages that deserve to be called logical and those that do not, then we cannot but bite the bullet and say that the concept of logical form is vague and possibly depends on the context and the purpose of the particular logical analysis. Except for some trivial cases, there is nothing as *the* logical form of a sentence, not even *the* logical form of the sentence in a given logical language (see also Peregrin, 2010). We do not have a serious problem biting the bullet, but we suspect that many logicians will. However, we are convinced that there is no way around it.

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Jaroslav Peregrin
Department of Logic
Institute of Philosophy
Czech Academy of Sciences
`peregrin@flu.cas.cz`
https://orcid.org/0000-0002-0460-1933

Vladimír Svoboda
Institute of Philosophy
Czech Academy of Sciences
`svobodav@flu.cas.cz`
https://orcid.org/0000-0002-9110-0087