

MAJOR PARTS OF SPEECH

Zoltán Gendler Szabó
Yale University

Abstract: According to the contemporary consensus, when reaching in the lexicon grammar looks for items like nouns, verbs, and prepositions while logic sees items like predicates, connectives, and quantifiers. In fact, there doesn't seem to be a single lexical category contemporary grammar and logic both make use of. I hope to show that while a perfect match between the lexical categories of grammar and logic is impossible there can be a substantial overlap. I propose semantic definitions for all the major parts of speech (noun, verb, adjective, and adverb). I argue that the differences among these categories can be captured in terms of distinctions recognized in logic (referring expression vs. predicate, constant vs. variable).

1. Grammar and Logic

Grammar and logic differ sharply in subject-matter and methodology. Grammar studies well-formedness and is the paradigm of empirical inquiry; logic is about validity and is a pure a priori discipline. Still, there is deep similarity between them: they both abstract from the content of expressions focusing on their form. We get well-formed sentences by combining phrases of the right kind of *grammatical form* and we get valid inferences by combining sentences of the right kind of *logical form*.¹

What is the relationship between the grammatical and the logical form of a sentence? Until the second half of the nineteenth century the two were not sharply distinguished: logic was supposed to deal with the form of thought, grammar with the form of its expression in language, and the latter was thought to be more or less faithfully mirroring the former. Doubts about the unity of sentential form started to mount when logicians like Boole, Peano, and Frege started to invoke mathematical structures in their investigations of logic. Their success led philosophers like Russell, Wittgenstein, and Tarski not only to distinguish grammatical and logical form but to say that the former is highly misleading to the latter. The attitude began to shift again in the 1960's

¹ I do not want to make the stronger claims that well-formed sentences are well-formed *in virtue* of their grammatical form and valid inferences are valid *in virtue of* their logical form. To provide a full explanation of well-formedness or validity we have to appeal to facts beyond form. For arguments that no validity is purely a matter of form, see Szabó (2012).

when semanticists started to present precise translations from small fragments of English into the language of type-theoretic intensional logic; the grammatical form of the translation was supposed to capture the logical form of the original. Subsequent work has shown that the core ideas of this approach can be carried to a great distance towards a fully integrated study of grammar and logic. Today Montague’s daring pronouncement that there is “no important theoretical difference between natural languages and the artificial languages of logicians” has come close to be the orthodoxy.²

Yet, there remain serious obstacles for the project of bringing grammatical and logical form together again. Let me illustrate some of them with an example. (1) is an English sentence and (2) a sentence of the language of first-order logic that is said (by countless logic textbooks) to capture its logical form. What this is supposed to mean is that the grammatical form of (2) is identical to the logical form of (1). Representing grammatical forms using nested labeled brackets, (1′) is the (simplified) grammatical form of (1) and (2′) the grammatical form of (2):

- (1) *Fido chews every rug*
 (1′) $[_S[_N Fido]][_{VP}[_V chews]][_{DP}[_D every]][_N rug]]]$
- (2) $\forall x(rug(x) \rightarrow chews(Fido, x))$
 (2′) $[_{Form}[_{LC} \forall] [_{Var} x]] [_{Form}[_{Form}[_{Pr1} rug]] [_{Var} x]] [_{LC} \rightarrow] [_{Form}[_{Ind} Fido]] [_{Pr2} chews]] [_{Var} x]]]$

(1′) and (2′) are not much alike. The most glaring differences are the absence of variables from (1′) and the presence of the material conditional sign in (2′). But these can be remedied. There are different ways to go about this, so let me mention just two fairly standard approaches. To get variables into the grammatical form of (1) we can assume that the determiner phrase ‘every rug’ moves from the object position to the front of the sentence leaving a co-indexed trace behind.³ And to get rid of the connective from the logical form of (1) we can assume that the universal quantifier takes two formulae (in sequence) as input rather than just one.⁴

² Montague (1970): 398.

³ This is called quantifier rising. It was first proposed in May (1985) and it remains one of the many popular options in for treating quantifiers in natural languages.

⁴ These are called generalized quantifiers, introduced first by Lindström (1966). Natural language quantifiers are typically interpreted by semanticists as generalized quantifiers of some sort.

- (1'') $[S, [DP [D \textit{every}] [N \textit{rug}]]_x [S [N \textit{Fido}] [VP [V \textit{chews}]] [t]_x]]]$
 (2'') $[Form [[LC \forall [Var x]] [Form [Pr1 \textit{rug}] [Var x]]] [Form [Ind \textit{Fido}] [Pr2 \textit{chews}] [Var x]]]$

This is a big improvement: as far as *bracketing* goes (1'') and (2'') are close.⁵ But with respect to *labeling* they remain far apart. When reaching into the lexicon, grammar sees a determiner ('every'), two nouns ('rug' and 'Fido') and a verb ('chew'), while logic sees a logical constant (' \forall '), a variable (' x '), an individual constant ('Fido'), a one-place predicate ('rug') and a two-place predicate ('chew'). Not only do we have here entirely different labels, the categorizations also differ: grammar distinguishes 'rug' and 'chew' but not 'rug' and 'Fido' – with logic, it's the other way around.

In this paper, I hope to show that the radical dissociation between grammar and logic at the lexical level is unnecessary: logic can use the sorts of lexical categories grammar is based on. This should be a big help in eventually unifying grammatical and logical form.

2. The limits of perspicuity

Let's start by fixing some terminology. According to the classical definition, two expressions belong in the same grammatical category just in case they can be intersubstituted in any sentence without loss of well-formedness.⁶ By analogy, we could say that two expressions belong in the same logical category just in case they can be uniformly intersubstituted in any inference without loss of validity. This yields a fine-grained categorization: it places 'to' and 'with' in distinct grammatical categories ('Alex walked right up to his friend' is well-formed, 'Alex walked right up with his friend' isn't) and distinguishes between the logical categories of 'or' and 'and' ('Alex walked; therefore he walked or talked' is valid, 'Alex walked; therefore he walked or talked' isn't). Let's call categories established by strict substitutional equivalence *narrow*. Broad categories are unions of narrow ones – thus, for example, nouns may count as a broad grammatical category even if count nouns and mass nouns are not intersubstitutable *salva beneformatione*, and unary quantifiers may count as a broad logical category even though ' \forall '

⁵ The remaining differences can be eliminated if we modify the syntax of the language of first-order logic along the lines suggested in section 7.4 of Heim and Kratzer (1998) and assume an analogous syntax for English.

⁶ Cf. Bar-Hillel (1953).

and ‘ \exists ’ cannot be uniformly substituted *salva validatione*. A language whose grammatical and logical categories are the same is *fully perspicuous*.

Full perspicuity is a tall order. Assuming valid inferences must be made up of well-formed sentences,⁷ sameness of narrow logical category entails sameness of narrow grammatical category. But the converse fails: in all but the dullest languages we have logical devices that allow building complex sentences from simpler ones, which means that we have expressions that sharing grammatical profile but nonetheless differ logically. (E.g. substituting ‘Snow is white’ for ‘Snow is white and grass is green’ always preserves well-formedness but it does not preserve the validity of ‘Snow is white and grass is green, therefore grass is green’.⁸)

Since complexity destroys the hope for full perspicuity, the next best thing we can hope for is *lexical perspicuity* – coincidence of narrow grammatical and logical categories within the lexicon.⁹ There are interesting languages that are perspicuous in this sense: the language of first-order logic with the logical symbols ‘ \neg ’, ‘ \vee ’, and ‘ \exists ’ is one example. Uniform substitution of non-logical constants preserves validity, and since the logical constants of this language all belong to different narrow grammatical categories (‘ \neg ’ take a formula and yields another, ‘ \vee ’ takes to formulae and yields a third, ‘ \exists ’ takes a variable and a formula and yields another formula) they too are vacuously intersubstitutable with any expression in the same narrow grammatical category *salva validatione*. But lexical perspicuity is an extremely fragile feature. Suppose we were to admit ‘ \wedge ’ as a new lexical item. The extended language is no longer

⁷ Some might find it convenient to call certain inferences valid even if they contain ill-formed sentences; e.g. ‘All men are mortal, Socrates is a man; therefore Socrates are mortal’. I am not opposed to call such arguments loosely valid, but then I would also insist that their premises and conclusions are loosely well-formed. By contrast, I would resist the idea that a string like ‘Man Socrates a is; therefore man Socrates a is’ is a valid inference. If valid inferences preserve truth then their premises and conclusions must be capable of truth.

⁸ One may object that ‘I know that snow is white and you know that snow is white and grass is green too’ is ungrammatical even though it is the result of substituting ‘Snow is white and grass is green’ for the second occurrence of ‘Snow is white’ within the perfectly well-formed ‘I know that snow is white and you know that snow is white too’. But I am not convinced that ‘I know that snow is white and you know that snow is white and grass is green too’ is ill-formed. Suppose it is common ground that the speaker knows that grass is green but it is very much up in the air whether he knows that snow is white. In this (admittedly slightly contrived) case the sentence does not seem out of place.

⁹ The lexicon is often characterized as a finite list of all the words of a language, but lexical items can also be non-compositional phrases – such as compounds (e.g. ‘dog run’), phrasal verbs (e.g. ‘run off’), or idioms (e.g. ‘on the run’). The traditional individuation of lexical items is sensitive to derivational morphology (thus ‘run’ and ‘running’ count as distinct lexical items) but not to inflectional morphology (thus ‘run’ and ‘ran’ count as the same lexical item).

lexically perspicuous because the conjunction and disjunction signs differ logically but not grammatically. We could add ‘=’ to the lexicon but only if we eliminate all non-logical two-place predicates; if we have, say, ‘≥’ in addition to ‘=’ lexical perspicuity is again violated.

Natural languages are not lexically perspicuous. English surely isn’t – it would be very hard to argue that pairs like ‘and’ and ‘or’, ‘same’ and ‘different’, ‘every’ and ‘some’ fall in different grammatical categories. Moreover, since natural languages gain lexical items all the time, and since we saw that such expansion can easily destroy lexical perspicuity, even if at some point we had a lexically perspicuous natural language, there is no reason to think that it would remain so. At the same time, most plausible candidates for being a logical constant are closed category expressions and lexical change is mostly concentrated in the open categories. If fully perspicuous languages are boring and lexically perspicuous languages are fragile, the natural question to ask is whether languages could be *lexically perspicuous in their open categories*.

The distinction between open and closed categories is commonplace in linguistics but is rarely discussed in philosophy. There is no precise definition – the distinction is supposed to be a natural one that we can demarcate only approximately. Closed categories tend to be small; their members tend to be short. Closed categories are more stable: we easily coin or borrow new nouns or verbs but when it comes to complementizers or inflections, change is slow and gradual. In addition, open categories do but closed categories don’t participate in derivational morphology. You can add a suffix to the adjective ‘legal’ and obtain the verb ‘legalize’ and then add another suffix to derive the noun ‘legalization’.¹⁰ By contrast, there are no suffixes you can stick onto ‘or’ – we have no words like ‘*orness’, ‘*orize’, or ‘*orful’. A fairly widely shared assumption in linguistics is that the open/closed distinction is significant and cross-linguistically well-attested. We can even extend it to formal languages by stipulating that expressions of closed categories are all and only those that are explicitly listed when the syntax and semantic of the language is specified. So, in the standard first-order language of arithmetic, the closed category expressions are ‘(’, ‘)’, ‘=’, ‘¬’, ‘∨’, ‘∃’, ‘0’, ‘+’, and ‘.’.

¹⁰ Of course, the English adjective ‘legal’ comes presumably from the Latin adjective ‘legalis’, which in turn was derived from the noun ‘lex’.

Formal languages are then trivially lexically perspicuous in their open categories. Natural languages may also have this feature, albeit this is definitely not a trivial hypothesis. Most lexical items in English that are plausible candidates for being a logical constant belong to closed categories – for example, ‘if’ is a complementizer, ‘every’ is a determiner, and ‘before’ is a preposition. But there do seem to be exceptions: ‘exist’ is a verb, ‘numerous’ is an adjective, and ‘usually’ is an adverb. Nonetheless, it is fairly easy to find sentences to attest that these words have unusual grammatical profiles.

- (3) ✓ There exist immortal men.
- (4) * There live/walk/talk immortal men.¹¹

- (5) ✓ Socrates has numerous young/rich/aristocratic followers.
- (6) * Socrates has young/rich/aristocratic numerous followers.

- (7) ✓ Usually when Socrates goes to the market he talks philosophy.
- (8) * Quickly when Socrates goes to the market he talks philosophy.

These and other distributional differences give us ground for conjecturing that ‘exist’, ‘numerous’, and ‘usually’ are not garden-variety verbs, adjectives, or adverbs. When we call them verbs of existence, adjectives of quantity, and adverbs of quantification we leave it open whether these categories are open or closed ones. My hunch is that any word in any language that can plausibly be taken to be a logical constant is grammatically idiosyncratic in one way or another and that these idiosyncrasies will ultimately justify calling them closed category expressions. If this is correct natural languages are lexically perspicuous in their open categories.

So, here is the situation. As far as narrow categories are concerned, grammar and logic must diverge outside the lexicon in all but the most trivial languages. Even within the lexicon, there can only be an accidental lineup which can be destroyed by extending the language with definable logical symbols. But the open lexical categories of grammar and logic do coincide in any standard formal language and possibly coincide in natural languages as well. In other words, we could *in principle* develop a grammar and logic for any natural language using a single set of

¹¹ Of course, (4) is well-formed if ‘there’ is a demonstrative; I am focusing on ‘there’ as an expletive as it is most naturally taken in (3).

open lexical categories. In light of the fact that the actual grammars and logics employ drastically different open categories this is a rather surprising fact.

Still, the interest of this result is limited. Switching to narrow categorization would bring grammar and logic closer but would otherwise not serve either particularly well. Narrow categories are extremely fine-grained which gives rise to three problems. First, there are so many of them that we have no idea what they are actually like. Second, we also don't know whether there is any real similarity across languages in terms of narrow lexical categorization. And third, we have no reason to suspect that narrow categories are needed to articulate interesting generalizations. It would be foolish to advocate abandonment of the usual coarse-grained open lexical categories. And as long as the classifications of words we actually appeal to in explanations of well-formedness and validity have nothing to do with one another grammar and logic remain far apart.

3. The broadest natural open lexical categories

The first known Greek grammar written in the second century by Dionysius Thrax distinguishes eight parts of speech: noun, verb, participle, interjection, pronoun, preposition, adverb, and conjunction. These categories have withstood the test of times well. We may want to expand the boundaries of some (we would count these days participles and prepositions as subcategories of adjectives and adpositions, respectively), and add a few new ones to the list (among others, the categories of articles, auxiliaries, classifiers, complementizers, and determiners), but these are relatively minor changes. And if we focus on the major parts of speech (the so-called *content* words) there is ample evidence not only that these are present in human languages across the world, but also that they have a major role to play in the organization and acquisition of grammar.¹² Explanations in terms of nouns, verbs, adjectives and adverbs are the bread and butter of linguistics as we know it; it is hard to imagine what the discipline would look like without them.

¹² While the question whether the major categories of speech are truly universal remains open, there are very few plausible examples of languages without them. For a detailed argument of their universality, see Baker (2003). The role of the major parts of speech in language acquisition is uncontested; the focus of research is on whether there are major differences in the way words belonging to different categories are learned. For a survey, see Gleitman and Wanner (1982).

We can think of the major parts of speech with the broadest open grammatical categories of the lexicon that have a significant explanatory role. This involves a modest amount of revisionism about their boundaries. Since broad categories are unions of narrow ones, no word in a closed category counts as a noun, verb, adjective, or adverb in this sense. Thus, for example, ‘three’ is neither a noun nor an adjective, but member of the closed category of numerals. Also auxiliary verbs are not genuine verbs and adverbs of quantification not genuine adverbs.

The usual way to identify the major parts of speech is by morpho-syntactic criteria. Nouns are supposed to be inflected for case and verbs for tense, adjectives are supposed to combine with nouns and adverbs with anything but nouns. These definitions have serious problems, especially if we apply them cross-linguistically. Mandarin Chinese has neither case nor tense inflections but is nonetheless taken to have both nouns and verbs. In English, ‘ready’ does not combine with nouns (you cannot say ‘The ready dinner is on the table’) but it is still an adjective, and ‘upstairs’ is an adverb even when it combines with a noun (as in ‘the room upstairs’). The morpho-syntactic criteria can be improved but the price is to appeal to significantly more abstract and controversial hypotheses about syntactic structure.¹³ Moreover, when we test these criteria we often appeal to intuitions about categorization and the fact that we have these intuitions seems hard to reconcile with the idea that there is nothing more to being a noun or verb than partaking in a certain linguistic distribution. Distributional criteria, it seems, merely point at something more fundamental that underlies categorization. And this more fundamental feature was always thought to be semantic: a common way in which words within these categories relate to the world.¹⁴ What makes a word a noun is that it signifies a person, a place, or an object. Similarly, the essence of verbs is that they signify actions, states, or events; the essence of adjectives and adverbs is that they signify qualities of whatever the word they combine with signifies.

¹³ For example, Baker (2003) argues that to be a verb is to be a lexical category that has a specifier and to be a noun is to carry a referential index consisting of a pair of integers. These bring hefty assumptions about what universal grammar must look like.

¹⁴ There is a contrast here with minor parts of speech (the closed lexical categories of grammar). On the traditional picture, these are fully characterizable in syntactic terms. They do not signify parts of reality and they contribute to the form, rather than the content of sentences.

The idea that major parts of speech have a semantic essence is alive and well in dictionaries and in the curriculum of elementary schools but it has lost most of its cache among linguists and philosophers. The problem is that if we take the usual semantic characterizations seriously, we have a deluge of counterexamples. ‘Water’, ‘thought’, or ‘addition’ do not signify anything like persons, places, or objects; ‘miss’, ‘stay’, or ‘live’ do not signify actions, states, or events; ‘fake’, ‘ample’, or ‘regrettably’ do not signify qualities. One may plead for an extended sense of the words ‘object’, ‘event’, or ‘quality’ or replace them with more recherché terms, like ‘entity’, ‘eventuality’, or ‘attribute’. But this only highlights that we don’t have a firm idea what exactly these ontological categories are supposed to be.

In light of the failure of the traditional semantic characterization of the major parts of speech, we might wonder what accounts for their pedagogical success. How do fourth-graders manage to tell verbs from nouns when the criteria they are taught is manifestly wrong? The usual line is to say that the criteria are good rules of thumb, even if they have lots and lots of exceptions.

Prototypical noun denotations are indeed objects (perhaps physical objects), prototypical verb denotations are events (perhaps actions), and prototypical adjective denotations are qualities (perhaps colors, shapes, and textures).¹⁵ Adverbs – well, they are a mess but at least the ones that modify verbs do tend to denote the qualities of actions. This suggestion makes sense and has some empirical support. But it does not help those who seek to pull grammar and logic closer. While sensitivity to prototypical meanings may well be part of linguistic competence, it is unlikely to play a role in explanations of well-formedness and validity.

Yet, we do need a semantic characterization for the lexical categories we employ; otherwise they cannot be used to provide semantic explanations. Formal semanticists provide such semantic characterizations in terms of *types*. The basic classification is due to Church, although the ideas go back to Frege and the notation is Montague’s. Types are enumerated recursively: (i) e and t are types, (ii) if α and β are types, so is $\langle\alpha, \beta\rangle$, and (iii) all types can be generated by a finite sequence of applications of (i) and (ii). Expressions of a type τ take their semantic values from the corresponding domain \mathfrak{D}_τ : \mathfrak{D}_e is the set of *entities*, \mathfrak{D}_t the set of *truth-values*, and $\mathfrak{D}_{\langle\alpha, \beta\rangle}$ the set of functions from \mathfrak{D}_α to \mathfrak{D}_β . So, the fundamental ontological categories underlying the

¹⁵ Croft (1991): ch. 2 and 3; Murphy (2010): 140.

divisions of the lexicon are between objects and functions, where the latter are further categorized according to the arguments they take.¹⁶

Alas, from the perspective of grammar, this yields a highly gerrymandered lexicon. Nouns belong to types e and $\langle e, t \rangle$ but mass nouns or relational nouns don't fit either type very well. Verbs tend to be of type $\langle e, t \rangle$ or $\langle e, \langle e, t \rangle \rangle$ but when it comes to drawing the grammatically crucial distinction between telic and atelic verbs, the type system is of no help. Intersective adjectives are of type $\langle e, t \rangle$, but that won't work for most other adjectives, which are typically assigned the type $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$. Adverbs are the hardest to assign types to: the ones that modify verb phrases should be of type $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$, the ones that modify sentences should be of type $\langle t, t \rangle$, except that many can do both.¹⁷

So, this is the state of play. Syntacticians keep using the broad open lexical categories which have served them well over the centuries. They have perfected the traditional morpho-syntactic tests with which we identify these categories but they have repudiated the semantic features these tests were supposed to track. Semanticists have kept the idea that the lexicon can be organized according to the kinds of things its members designate but they acknowledge that this categorization is completely gerrymandered from the perspective of syntax. This split between the lexical categories employed in grammatical and logical explanations is accepted because traditional attempts to make semantic sense of nouns, verbs, adjectives, and adverbs failed. I think we should reject the status quo and seek novel semantic characterizations for the major parts of speech.

The core of my proposal is that we have given up on finding a *semantic* characterization for major parts of speech because we assumed that this is tantamount to an *ontological* characterization for these categories. This is a mistake. Semantics concerns the way our words relate to the world – words can thus differ from each other semantically even if they relate to the very same things as long as they are related to them in different ways.

¹⁶ Formal semanticists these days usually adopt the standard mathematical reduction of functions to relations and of relations to sets. (This would have been anathema to Frege, who thought that functions are unsaturated entities while sets are just special sorts of objects.) If we take these reductions seriously, the fundamental ontological categories underlying lexical divisions are those between objects and sets.

¹⁷ Compare 'Recklessly, Hugo opened the door' and 'Hugo opened the door recklessly'.

4. Nouns

The English words ‘name’ and ‘noun’ have a common origin and were used interchangeably until recently. There is, of course, a real difference between nouns used to name one (proper nouns) nouns used to name many (common count nouns) and nouns used to name much (common mass nouns), but we cannot automatically assume that the relationship between nouns and whatever they stand for is itself different in each of these cases. I suggest that we return to the idea backed by etymology: nouns are names, lexical constants whose semantic role is to refer.

But isn’t this idea thoroughly discredited? Geoffrey Pullum asks what most linguists and philosophers probably think: “But aren’t all words names? Don’t verbs name actions? Doesn’t a preposition like *under* name a spatial relation?”¹⁸ I don’t think so. If verbs name actions then presumably when you see an action and ask what it is called you could say ‘run’. Of course, you say ‘running’ instead, which is not a verb but a gerund (and hence a noun). Similarly, if ‘under’ named a spatial relation then presumably when you identify that relation you could call it ‘under’. Of course, all you can call it is ‘being under’, which again is not a preposition but complex gerund (and hence a nominal expression). This seem to me to be a perfectly general pattern: nouns and only nouns can give you a one word answer to the question ‘What is that thing called?’ Nouns are lexical devices of reference.

Nouns: to be a noun is to be an open category lexical constant that purports to refer.

I said what I can about what it is to be an open category; now I will clarify what I mean by the ‘purport to refer’ and ‘constant’ in this definition. To purport to refer is to refer provided certain conditions are met. Referring expressions have semantic clauses that spell out conditions of reference. For example, the bare semantic clause for the noun ‘deer’ takes the following form:

(9) for all x , ‘deer’ refers to x if and only if x is a deer

¹⁸ In the Language Blog of *Lingua Franca*, June 20, 2012. Thanks to Justin Khoo for the pointer.

If the conditions are never met (as in the case of ‘unicorn’ or ‘phlogiston’) the noun fails to refer, but such a failure does not change its semantic role – it is still a referring expression.

Bare semantic clauses only tell us the conditions under which ‘deer’ *actually* refers to something right *now*. To assign semantic values to modalized and tensed sentences in which this word occurs as a constituent we also need to know the conditions under which something was referred to, will be referred to, and could be referred to by ‘deer’. How exactly to do this depends on modality and tense are treated in the semantics, but replacing (9) with (9′) would fit well with many standard approaches.

(9′) for any times t and possible worlds w , for all x , ‘deer’ refers at t and w to x if and only if x is a deer at t and w

In what follows I will usually ignore tense and modality and state the semantics of lexical items using bare clauses, like (9).

To be a lexical constant is to be a lexical item whose meaning determines what it designates. This is a fairly standard way to use this term; what is less standard is that I will call *all* non-constant lexical items variables. This includes the variables of formal languages: what they designate depends on the assignment function, and the assignment function is not fixed by the interpretation function. According to most semanticists natural languages contain more or less close analogous of the variables of formal languages – the so-called bound uses of pronouns (e.g. in ‘Every mother knows her child’) being perhaps the most obvious examples. But there are many other expressions besides these that count as variables in the broad sense I am using this term. Indexicals are also lexical variables, for context plays a role in determining what they designate. There are some lexical variables traditionally categorized as nouns, such as ‘tomorrow’, ‘here’, or ‘self’.¹⁹ These all have syntactic distribution that sets them apart from run-

¹⁹ Many of these context-sensitive words have homonyms that are adverbs; e.g. the first word is a noun in ‘Tomorrow is a Friday’ but an adverb in ‘Tomorrow we go swimming’. In Stanley and Szabó (2000) we argued that all nouns are variables in this broad sense – their lexical meaning includes an element which designates the domain for quantificational determiners the nouns combine with. Stanley (2002) has amended this view by claiming that these elements occupy their own leaf in the syntactic form of quantified sentences. Whether the details of the latter proposal are exactly right is a matter of debate; that it is an improvement over the earlier one is not. Domain-sensitivity is not a good reason to abandon the view that nouns are constants.

of-the-mill nouns, and they plausibly belong to closed lexical categories. The same holds of pronouns, such as ‘I’, ‘yourself’, or ‘those’. These are all referring expressions but variable ones – they refer to one thing or another depending on the vagaries of context.²⁰

Nouns are not the only constants that purport to refer – outside the lexicon there are many more. For if nouns refer, so do nouns modified by adjectives and relative clauses (expressions of the syntactic category *N'*). Typical determiner phrases (‘every deer’, ‘most deer’, ‘no wine’, ‘much of the wine’, etc.) are used to express quantification, and as such, are not referring expressions. There might be some determiner phrases that are nonetheless referring expressions – possible examples include ‘the deer’, ‘those deer’, ‘that deer’, and ‘a certain deer’. Whether these are referring expressions is a controversial matter, which I will set aside. My current focus is exclusively on the lexicon.²¹

Not all nouns have reference conditions, like ‘deer’ – if you replaced ‘deer’ by ‘wine’ in (9) on both sides of the biconditional you get a falsehood. ‘Wine’ refers to, among other things, the wine in my glass, yet the wine in my glass is not *a* wine. The bare semantic clause for ‘wine’ must be stated differently:

(10) for all x , ‘wine’ refers to x if and only if x is some wine

Count and mass nouns are subcategories of nouns – they differ from one in their grammatical distribution. One of the differences is in the kind of indefinite determiner they combine with: mass nouns cannot take the indefinite article ‘a(n)’. This difference is exploited in (9) and (10), which exhibit the general form of semantic clauses for count and mass nouns, respectively. It is

²⁰ Relational nouns – such as ‘mother’, ‘enemy’, ‘speed’, ‘temperature’ – are sometimes interpreted as variables. The idea is that to be a brother is to be a brother of x , where the value of x is supplied by context. My view is that to be a brother is simply to be someone’s brother – which is fully compatible with ‘brother’ being a constant. It is undeniable that relational nouns form a subcategory of nouns distinguishable both by grammatical and logical features: ‘Some Labradors are Bill’s dogs’ is well-formed, ‘Some Bulgarians are Bill’s friends’ is not, ‘Bill’s dogs are Labradors; therefore Bill has dogs’ is valid, ‘Bill’s friends are Bulgarians; therefore Bill has Bulgarians’ is not. But these differences can be captured in the compositional semantics without treating ‘brother’ as a variable.

²¹ I do think it is interesting that definite descriptions can be used to say what something is called but complex demonstratives and specific indefinites are marginal at best.

well-known that count nouns can have mass occurrences and mass nouns count occurrences. Standard examples include (11) and (12):

- (11) Jack thawed some frozen deer and made a stew.
- (12) Jill picked an excellent wine for the dinner.

One could respond to these facts by insisting that the count/mass feature of nouns is lexically undetermined. But the fact that there is no neutral way to restate clauses (9) and (10) suggests that it is probably best to stick with encoding the distinction in the lexicon. Then (11) and (12) must contain unpronounced items whose semantic function is to turn ‘deer’ (or perhaps ‘frozen deer’) into a device of mass reference and ‘wine’ (or perhaps ‘excellent wine’) into a device of count reference.

What should we say about proper names? Perhaps nothing; the reference conditions I proposed for count nouns work for proper nouns as well.

- (13) for all x , ‘Socrates’ refers to x if and only if x is a Socrates

Does (13) tell us enough about ‘Socrates’? I think so. It is not incumbent on a semantic theory to provide a deeper account of what, if anything all the entities ‘Socrates’ refers to have in common. Take the teacher of Plato (1,090,000 Google hits), the Brazilian soccer player (386,000 Google hits), and the real estate company in Astoria, NY (10,600 Google hits). They don’t seem to share many characteristics, except perhaps that they all bear the name ‘Socrates’. Whether this is so is an interesting question for metaphysics just like the question whether the entities ‘horse’ refers to have something interesting in common beyond the fact that they are called horses. I am not denying that linguistic competence with a noun may require that we know something about such matters. Maybe to understand ‘horse’ you need to know something about what a typical horse looks like and maybe to understand ‘Socrates’ you need to know that language permits us to call just about anything Socrates (assuming others go along) irrespective of the characteristics of that thing. But such claims are hard to test – it is very murky what exactly one must know about the shared nature of some things in order to competently refer to them. My point is that, for

better or worse, semantic theory has not been encoding this sort of information about words and there is no reason to pose higher than usual demands in the case of proper names.

A theory that uses (13) to interpret ‘Socrates’ can use a completely analogous clause for ‘Apollo’ as well. This is a big plus: to provide uniform clauses for all proper names is an important desideratum for all who think semantic theories encode information that is in some way known to competent speakers. But even those who think of semantics as a theory radically divorced from human psychology should eschew semantic distinctions that have no linguistic reflexes.

The insight that proper names are rigid – which is contested but remains intuitively plausible – can be captured straightforwardly by assigning a temporal and modal profile to ‘Socrates’ as follows:²²

(13’) for any time t and possible world w , for all x , ‘Socrates’ refers at t and w to x if and only if x is a Socrates

In other words, ‘Socrates’ picks out the same things across times and worlds – the ones who are among the Socrateses at our time and world. By contrast, ‘deer’ picks out different things across times and worlds – the things that are deer at that time and world.

Inferences might seem to pose an obvious problem for the semantics I am recommending. Consider ‘Socrates is bald and Socrates is short; therefore something is both bald and short’. I have not said how predication is to be interpreted, but as long as ‘Socrates’ can refer to more than one thing it’s hard to see how this could come out as valid. Yet, it surely seems to be. My inclination is to draw a distinction here between the *inference* and the *reasoning* it is typically used to express. Using the singular ‘is’ throughout the argument indicates that the speaker intends to refer in every instance to just one Socrates and that the occurrence of this name in the second premise and the conclusion is supposed to refer to whichever Socrates is referred to in the first premise. This extra pragmatic information, together with the semantics of the premises and the conclusion is enough to ensure that the reasoning is truth-preserving. The inference, by itself, is not.

²² This captures obstinate rigidity; the clause can be adjusted if ‘Socrates’ is deemed to be persistently rigid.

There are syntactic differences in English between proper nouns and ordinary common nouns, the most important of which is the fact that bare singular uses of ordinary common nouns are at best borderline grammatical, while proper nouns typically occur without articles or determiners. But there are many significant subcategories of count nouns – take gerunds, relational nouns, compound nouns, animate nouns, etc. All these have a slightly different syntactic distribution. Why should we assume that proper nouns stand out as a completely distinct category? Many philosophers believe that the fact that bare common nouns cannot occur as subjects of simple sentences in the way proper nouns can is a *deep* difference between them, one that may be best explained by assuming that only the latter are referring expressions.²³ But I don't see why we should believe this. This is just a parochial fact about English, one that fails to hold for other languages, such as Chinese, Russian, Hindi, and Hungarian.

I suspect that despite my best efforts many will still feel that it is a mistake to lump proper names with ordinary count nouns: the intuition that singularity of reference is part of the semantics of a proper name is strong. If I am mistaken, the theory I am advocating can still survive. It is easy to formulate a semantic clause for 'Socrates' that guarantees that if it refers at all, it refers to just one thing:²⁴

- (14) for all x , 'Socrates' refers to x if and only if x is identical to Socrates
- (14') for any time t and possible world w , for all x , 'Socrates' refers at t and w to x if and only if x is identical to Socrates

Like the clause I prefer, (14) can provide a perfectly uniform semantics for all proper names, including empty names. But there is a price. Unlike (13), (14) entails by standard existential generalization that for some y , for all x , 'Socrates' refers to x if and only if x is identical to y , that is, that 'Socrates' is not empty. To preserve neutrality on the matter one must say one of two things: that the correct semantics of English contains false clauses or that the correct logic of

²³ Note that if this is supposed to be the criterion, English mass nouns all turn out to be referring expressions.

²⁴ This is the clause neo-Davidsonian would assign to proper names; cf. Larson and Segal (1995), ch.5 and Sainsbury (2005), ch.3. It is customary to write the right hand side of (14) as ' $x = \text{Socrates}$ '. I think it is best to state our semantic clauses without appealing to resources from different languages: '=' is not a word of English, 'if' is not a word of the standard formal languages of logic. This might sound nit-picky but it isn't. When we mix languages we smuggle in assumptions about the grammar of these languages – in this case, the assumption that the noun 'Socrates' is grammatically like an individual constant. I think this false, but even if it were true it would need to be established rather than simply taken for granted.

English is non-classical. There are able defenses of either of these views in the literature.²⁵ Still, these are hefty commitments, which is why I recommend (13), rather than (14) as the semantic clause for ‘Socrates’.

There are two standard ways to use the word ‘reference’ in the semantic literature: the broad Fregean way and the narrow Russellian way. Reference in the Fregean sense of the word is a relation that all expressions bear to a certain item. Talking this way you might say, for example, that predicates refer to properties, or that sentences refer to sets of possible worlds. Reference in the Russellian sense of the word is a relation only a handful of expressions bear. For this relation to hold there must be a special kind of rapport between certain uses of the expression and the item in question. Talking this way you might say that only some proper names and indexicals used with right kind of intention refer. I have no objection to either of these uses of the word ‘reference’. But I believe that both are far removed from the ordinary meaning of ‘reference’ and I doubt that they have genuine theoretical value in the study of language. The ordinary notion of reference is linked to calling things by names and theoretically useful semantic relations link natural linguistic categories to extra-linguistic items. This is why I think it’s best to say that many but not all expressions purport to refer and that among the open category lexical items these are exactly the nouns.

5. Verbs

It is widely accepted that verbs are predicates – the sorts of expressions we use to say something about things. I want to push the idea further: I suggest that this is what captures the essence of verbs.

Verbs: to be a verb is to be an open category lexical constant that purports to predicate.

²⁵ Larson and Segal (1995) argue that semantics theory is hardwired and its sole function is to deliver interpretative T-sentences using extremely weak logical resources. If this is so, there is no reason why the axioms of the theory couldn’t be false – as long as the T-sentences it derives are all true the theory does exactly what it is supposed to. Sainsbury (2005) argues that the right logic employed in the meta-language of a semantic theory of English is a negative free logic. Since he thinks the semantics should ideally be homophonic, this amounts to a commitment that the logic of English is non-classical.

It is also widely accepted that verbs are predicates of their *arguments* – that the things of which verbs say something are the things referred to by expressions filling their argument places.²⁶ Thus, ‘Jack ran the Boston Marathon’ predicates of Jack and the Boston Marathon that the former ran the latter. This I reject.

My reason for rejecting that verbs are predicates of their arguments is this: I think ‘Jack ran the Boston Marathon’ logically entails ‘Jack ran’, while ‘Jack ran’ does not logically entail ‘Jack ran something or other’. (The latter inference is probably valid, but its validity is like that of the inference from ‘Jack ran’ to ‘Jack ran somewhere’, to ‘Jack ran somehow’, or to ‘Jack ran some distance whose length exceeds 0’. I would insist that it is not the job of logic to account for such validities.²⁷) The standard view is that (ignoring tense) the English sentence ‘Jack ran the Boston Marathon’ is synonymous with (15), where j , and b are individual constants referring to Jack and the Boston Marathon, respectively, and run^2 is a two-place predicate true of a thing and another just in case the first runs the second.

$$(15) \quad run^2(j, b)$$

When it comes to ‘Jack runs’ the standard view offers two options. It is either synonymous with (16), or with (17), where run^1 is a one-place predicate true of a thing just in case it runs.

$$(16) \quad \exists x run^2(j, x)$$

$$(17) \quad run^1(j)$$

But (16) is also what the standard view offers as a synonym for ‘Jack ran something or other’ and (17) does not follow logically from (15). So, I reject the standard view and with it the claim that verbs are predicates of their arguments.

²⁶ Of course, if the argument places are filled by quantifying expressions then verbs says something *relative to an assignment* about the things referred to *relative to the same assignment* by expressions filling their argument places.

²⁷ Parsons (1990): 98 argues that inferences of this sort aren’t valid at all. Jill can dream that she is stabbed but nobody stabbed her, which suggests that stabbings without stabbers aren’t logical impossibilities.

But then what are verbs predicates of? Following Davidson, I suggest that they are predicates of events: ‘run’ is true of runnings.²⁸ Following the followers of Davidson, I will also insist that they are true of nothing else: ‘run’ in all its occurrences is a one-place predicate true of runnings and not of runners.²⁹ Thus, if we wish to find a sentence in a standard formal language that is approximately synonymous with ‘Jack ran the Boston Marathon’ and ‘Jack ran’ we can use (18) and (19), respectively:³⁰

(18) $\exists x (run^1(x) \wedge Agent(x, j) \wedge Theme(x, b))$

(19) $\exists x (run^1(x) \wedge Agent(x, j))$

While there is flexibility in what sorts of arguments a verb has within a sentence the lexicon does specify the number and type of argument places it has intrinsically. The lexicon tells us that ‘run’ takes an Agent and a Theme and it also specifies that only the former is obligatory. Standard formal languages differ from natural languages in failing to mark arguments thematically as well as in forbidding optional arguments.

When I say that verbs are true of events I am using the label ‘event’ in an extended sense: colloquially speaking, a running may not be an event (but rather a process) and a standing is definitely not one (it is a state). This is just a matter of terminology; I will follow standard practice in the semantic literature in calling anything that a gerund purports to refer to an event.

Verbs are all devices of monadic predication but they differ amongst themselves in the manner in which they predicate. One of the differences parallels the difference between count and mass nouns:

²⁸ Davison (1967).

²⁹ Parsons (1990) and Schein (1993). Note that the argument I presented above targets the assumption that verbs are predicates of their arguments *alone*. Davidson could say that *run* is a two-place predicate of runnings and runners. Then the logical form of ‘Jack ran’ could be ‘ $\exists x run(x, j)$ ’ and of ‘Jack ran the Boston Marathon’ could be something like ‘ $\exists x (run(x, j) \wedge Theme(x, b))$ ’. Then we do predict that ‘Jack ran the Boston Marathon’ logically entails ‘Jack ran’ but the latter does not logically entail ‘Jack ran something or other’, as desired. Note however, that the proposal lacks independent support. While there are proposals on the market that recommend thematic separation of *only* the external argument of verbs, to my knowledge there is no precedent for separating only an internal argument. Thanks to Jonathan Schaffer for discussion.

³⁰ Note that I am *not* saying that this is the logical form of these sentences. The project is to keep grammatical and logical form in natural languages as close as possible and the grammatical form of (26) and (27) is nothing like the grammatical form of any English sentence.

- (20) for all x , ‘cross’ is satisfied by x if and only if x is a crossing
 (21) for all x , ‘walk’ is satisfied by x if and only if x is some walking

The distinction here is the one between telic and atelic verbs. These verbs differ markedly in their distribution, one standard difference being their combination with different temporal prepositional phrases; cf. ‘Jill crossed the Atlantic ✓in/?? for four days’ vs. ‘Jill walked ??in/ ✓ for four days.’³¹

Verbs are often subcategorized according to the number of arguments they take. But if we want to account for syntactic distribution we have to go more fine-grained. Some intransitive verbs take a subject that is external to the VP (these are called *unergative* verbs and they include ‘run’, ‘talk’, and ‘work’) and some take a VP-internal subject (these are called *unaccusative* verbs and they include ‘fall’, ‘sleep’, ‘arrive’). The distinction is captured thematically: the Agent role is assigned to an external argument while the Theme role is internal.³² It is a reasonable conjecture that the narrow lexical categorization of verbs goes by the thematic roles they assign.³³

Outside the lexicon there are many more predicates. Verbs modified by adverbs and prepositional phrases (and in general most expressions of the syntactic category *V'*) are plausible examples. But once an adverb of quantification is in the mix (as in ‘eat dinner usually after 8pm’) the resulting expression is no longer a predicate of events. This is similar to what happens in the nominal domain: once nouns combine with a quantificational determiner, their semantic function changes. Within the lexicon there are also some predicates that don’t behave like regular verbs: they are auxiliaries and fall within closed lexical categories. One example is the pro-verb ‘do’ which can be interpreted as a predicate-variable. Like a pronoun, a pro-verb has its designata relative to an assignment.

³¹ The strings marked by ‘??’ are not ungrammatical, but they require a special interpretative effort. ‘Jill crossed the Atlantic for days’ is fine if read as saying that Jill kept going back and forth between the two sides of the Atlantic for four days and ‘Jill walked in four days’ is fine if understood as saying that four days after the reference time Jill walked.

³² See Gruber (1965), Chomsky (1981), Grimshaw (1990).

³³ Couldn’t we say that the semantic essence of verbs is that they assign thematic roles? No: some nouns assign thematic roles as well (e.g. relational nouns, like ‘mother’ or ‘friend’ have Themes) and some verbs assign no thematic role (e.g. weather verbs, like ‘rain’ and raising verbs, like ‘seem’) to their subjects.

Some verbs are vacuous predicates. The difference in meaning between (22) and (23) is straightforward: the former says that last night at the president's dinner a taking of a napkin by Jill took place, the latter that there was a having of a napkin by Jill.

(22) Last night at the president's dinner, Jill took a napkin.

(23) Last night at the president's dinner, Jill had a napkin.

Takings are not havings (the former *results* in the latter), so the sentences say different things. By contrast, (24) and (25) are near-synonyms and it would be bizarre to suggest that they are about takings or havings.

(24) Last night at the president's dinner, Jill took a nap.

(25) Last night at the president's dinner, Jill had a nap.

The occurrences of 'take' and 'have' in (24) and (25) are not ordinary verbs – they are *light verbs*. I suggest that all light verbs are predicates true of any event, which is why (24) and (25) mean almost the same thing. The subtle difference between them is due to the fact that the light 'take' assigns the Agent role to its subject, while the light 'have' assigns the Experiencer role. This is not to say that (24) could be true without (25), or vice versa. But if there is an entailment in either direction, it is not a matter of logic.

I maintain that verbs are the only open-category lexical predicates. But nouns and adjectives can also be used predicatively, which then needs an explanation. I say that there is some extra structure within the relevant sentences responsible for turning non-predicates into predicates. Moreover, I think there is independent evidence in favor of this view.

The most striking thing about nominal and adjectival predicates in English is that they contain the copula – an extra element missing from verbal predicates. Logicians writing in Latin made a lot of this fact: the view that propositions invariably have a subject and a predicate term joined by the copula which expresses the relation between the two was a commonplace of textbooks until the nineteenth century. Verbs – a *prima facie* counterexample to this claim – were analyzed as compounds made up of the copula and the corresponding participle: 'Socrates currit' was

supposed to be ‘Socrates est current’ in disguise. But the emphasis on the copula looks suspicious if you are a native speaker of, say, Russian where you can get well-formed sentences by simply juxtaposing a noun with another noun or an adjective. Moreover, even languages that fail to permit this in a main clause have embedded nominal and adjectival predication without the copula (cf. ‘Some of his colleagues regard Jack a liar’ and ‘His wife considers Jack dishonest’). The majority view in linguistics these days is that the role of the copula is simply to serve as a hook for tense and aspect which in many languages can only be attached to a verb – when the clause requires no tense or aspect marking, as in the complements of ‘regard’ or ‘consider’, the copula becomes otiose. In other words, the copula is not essential for predication.

The crucial evidence for extra structure in nominal and verbal predicates comes from coordination and can be best seen in embedded non-finite clauses.³⁴ The basic fact is that nominal and adjectival predicates coordinate with one another but verbal predicates coordinate with neither:

- (26) ✓ Jack made Jill dishonest and a liar.
 (27) * Jack made Jill cheat and dishonest.
 (28) * Jack made Jill cheat and a liar.

Why is (26) is well-formed? ‘Dishonest’ and ‘a liar’ belong to different syntactic categories, so it is quite unexpected that we can conjoin them. One possibility is that when adjectival phrases (AP) or nominal phrases (NP) are used predicatively they become complements of an empty predicative head (PR) and form a predicative phrase (PRP).³⁵ Coordination occurs, as expected, between phrases of the same category:³⁶

- (26') ✓ Jack made Jill [_{PREDP} [_{PR}∅][_{AP} dishonest]] and [_{PREDP} [_{PR}∅][_{NP} a liar]]

But if this is why (26) is well-formed it becomes puzzling why (27) and (28) are not. Why couldn't the verb phrase be a complement of PR? The idea is that since verb phrases are already predicates, there is no need to turn them into predicates by means of PR. And in an economical

³⁴ Once you have predicates inflected for tense and aspect, they are all full VP's and can be freely coordinated; cf. ‘Jack cheats, is dishonest, and is a liar’.

³⁵ PR is sometimes optionally voiced in English as ‘as’; cf. ‘I regard you (as) a friend.’ Overt PR is present in many languages throughout the world; cf. Baker (2003): 40.

³⁶ This sort of proposal was argued for in detail in Bowers (1993, 2001).

system if there is no need there is no way. Thus, in (27) and (28) we end up with ungrammatical coordination between different syntactic categories.³⁷

(26') * Jack made Jill [_{VP} cheat] and [_{PREDP} [_{PR}∅][_{AP} dishonest]]

(27') * Jack made Jill [_{VP} cheat] and [_{PREDP} [_{PR}∅][_{NP} a liar]]

I will assume that the semantic function of PR is to generate predicates. 'Dishonest' and 'a liar' are not predicates but [_{PREDP} [_{PR}∅][_{AP} dishonest]] and [_{PREDP} [_{PR}∅][_{NP} a liar]] are: the former is true of any state of dishonesty, the latter of any propensity to lie. When someone is said to be dishonest the claim is that there is a state of dishonesty he is in, when someone is said to be a liar the claim is that there is a propensity to lie he has.

Distinguishing referring and predicating expressions as I have done is likely to meet with some skepticism. I say that 'greeting' refers to greetings and that they are precisely what satisfies 'greet'. The two words differ semantically not because they designate different things but because they designate the same things in different ways.³⁸ On the one hand, this is certainly good – we have an account of the meaning-difference between verbs and their corresponding gerunds without postulating what seems like a spurious ontological difference. On the other hand, one might be suspicious – we can't really grasp what the difference is supposed to be without having a firm grip of what the difference between reference and predication is supposed to be.

I do not claim to have fully elucidated the meaning-difference between 'greeting' and 'greet'. What I claim is that these words are not synonyms and what I offer is a theory that has the means to distinguish between their meanings. That there is more to meaning than designation (even designation relative to assignment, context, and index) and that consequently we will have to acknowledge more than one semantic relation is a moral that some philosophers have embraced independently of the issues I focused on.³⁹ I do not have much to say about the nature of the reference and predication relations but there is something that sets them apart on the view I

³⁷ The argument is from Baker (2003): 78.

³⁸ I suspect '[_{VP} greet]' and '[_{PREDP} [_{PR}∅][_{NP} a greeting]]' are synonyms. This explains the near-perfect synonymy of 'Socrates greeted Plato' and 'A past greeting of Plato was by Socrates'.

³⁹ See Furth (1968) and Burge (2007).

proposed: it seems that anything whatsoever can in principle be referred to, but there is no reason to think that predicates can be used in the same unrestricted way. The things available for predication are events in the extended sense of the word employed by neo-Davidsonians. Lots of things are events in this sense but probably not everything. ‘[PREDP [PR \emptyset][NP a liar]]’ is a genuine predicate but it is not true of liars, but rather of their propensity to lie – i.e. a condition or disposition that makes a liar a liar. I think there is good reason to doubt that liars are the sorts of things that can satisfy any predicate.⁴⁰

Semantic theories for formal languages routinely distinguish between the two semantic relations I appeal to. Consider the language of first order Peano Arithmetic. In that language, ‘0’ is an individual constant and ‘ $\neg\exists y (N(x) \wedge s(y) = x)$ ’ a one-place predicate true of those natural numbers x that do not have a predecessor. Both of these expressions designate the same thing – the number zero. Do we have a good grip of the difference between the ways they relate to zero? I think we do: the first one refers to it; the second is satisfied by it. But I argued that this is exactly the same as the difference between the way ‘greeting’ and ‘greet’ relate to greetings. Thus, I think we have reason to think that we understand the distinction just fine.

6. Adjectives and adverbs

Adjectives can occur in a sentence attributively (as in ‘This is an interesting problem’) or predicatively (as in ‘This problem is interesting’). Semanticists who want a uniform semantic treatment for adjectives must declare one or the other of these types of occurrences as primary, and explain the other in terms of it. Within semantic theories following Montague’s footsteps this came down to a choice of semantic type. One option is to say that adjectives are of type $\langle e, t \rangle$ and when they appear attributively, they are interpreted as contributing a conjunct to sentences. Thus, when something is called an interesting problem, we say that it is a problem *and* it is interesting. This is the predicate account of adjectives. The alternative is to construe adjectives as expressions of type $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$ and say that when they appear predicatively, they

⁴⁰ Of course, there are artificial languages with such predicates. In a language of first-order logic we can introduce a non-logical constant *liar* and we can stipulate that it is a predicate satisfied by x if and only if x is a liar. But this word has no proper translation to English. The noun ‘liar’ comes close, but it differs from *liar* in being a referring expression, rather than a predicate.

modify a covert noun. Thus, when something is called interesting, we say that it is an interesting N , where N is contextually provided. This is the modifier account of adjectives.

I don't accept either of these approaches but I think both offer insights worth preserving. What I want to suggest is that adjectives are like nouns in purporting to refer but they are unlike nouns in relying on context to do so. Adjectives are variables: they refer relative to the context of use. Their essence can be captured as follows:

Adjectives: to be an adjective is to be an open category lexical variable that purports to refer.

We cannot say that 'interesting' refers to the interesting things for a paragraph could be an interesting story without being interesting prose. The paragraph is interesting in some way but not in another. This suggests that 'interesting' refers to things that are interesting in contextually given way. I believe this works for adjectives in general.⁴¹

(28) for all contexts c , for all x , 'interesting' refers to x in context c if and only if x is interesting in way c^w

I will not take a stand on what contexts are and how they deliver ways. (The simplest idea is Kaplan's: contexts can be n -tuples, and ways can be one of their coordinates and that they change continuously as time progresses.) What a clause like (28) predicts is that you can *in principle* be referring to different ways of being interesting as long as you have different occurrences of 'interesting'. This seems correct: when someone utters 'I met some interesting writers and some interesting directors' the writers and the directors can easily be interesting in different ways but when someone utters 'I met some interesting writers and directors' they clearly cannot.

One of the nice things about the account is that – since it treats adjectives as devices of reference – it predicts that it makes sense to use adjectives to call things something. At the same time, we

⁴¹ For arguments in favor of indexicalist semantics for adjectives, see Szabó (2001) and Rothschild and Segal (2009). The current proposal differs from both in not treating adjectives as predicates.

cannot use adjectives in similar constructions when the issue is what something is called, not what one calls it.

(29) Bill was called stupid by Bud.

(30) ?? Bill is called stupid.

This is a puzzling pair, but my suggestion about what nouns and adjectives are makes sense of the pattern. You can call someone stupid just like you can call him a moron. That's because 'stupid' is an adjective, which is – like the noun 'moron' – a referring expression. But adjectives are lexical variables: what they refer to varies with the context of use. You cannot attach them to anything once for all – in a different context they may no longer refer to that thing. In particular, Bill could be stupid as a poker player (and hence, properly called stupid when the context makes poker salient) but brilliant as a basketball player (and hence, not properly called stupid when basketball is discussed).

The idea that the semantic difference between nouns and adjectives is context-sensitivity also explains meaning-differences between minimal pairs:

(31) Those are Italian.

(32) Those are Italians.

There are many ways to be Italian. Suppose (31) is uttered while the speaker is pointing at some cars – in some contexts the sentence is true just in case those cars are Italian-made, in others if they are Italian-owned, in yet others if they are registered in Italy. Yet, there is no similar context-sensitivity when it comes to (32). There aren't multiple ways to be an Italian – to be an Italian is to be a citizen of Italy. In general, when we turn a noun into an adjective, we often feel that we add context-sensitivity – there is just one way to be a sketch but many ways to be sketchy, just one way to be president but many ways to be presidential, just one way to be an idiot but many ways to be idiotic, etc.

There is a fairly productive way to turn adjectives to nouns using the suffix '-ness'. If adjectives are variables and nouns constants then whatever else '-ness' does, it must eliminate context-

sensitivity. This might seem like a problem, since ‘be happy’ and ‘have happiness’ appear to be synonyms. But the problem disappears as soon as we assume that the semantic function of ‘have’ is to reintroduce the very same context-sensitivity ‘-ness’ has eliminated from ‘happy’. The possessive morpheme works the same way, thus we needn’t have any problem acknowledging that Sam’s happiness exists just in case Sam is happy.

That adjectives are context-sensitive is hardly news: it is quite obvious that a person who is 6’4” would be called tall in a context where the salient comparison is the class of all males but not in a context where the salient comparison is the class of NBA players. In one of the standard semantic theories of adjectives, it is the comparative form ‘taller’ that is taken to be basic and the meaning of the absolute form is given by comparison to a contextually given degree: to be tall is to have tallness whose degree exceeds the contextually given degree.⁴² We might think of degrees as aspects of contextually provided ways: when a five year old is called tall, she is not being called tall in the way in which a giraffe is tall.

Like the predicate account, this proposal can explain predicative uses of adjectives without postulating a silent noun the adjective modifies. Of course, since on my view adjectives are referring expressions, there is some extra complexity: adjectives must be complements of PR to form predicates. Attributive uses are interpreted conjunctively – ‘interesting book’ refers to things that are both books and interesting in a contextually given way. Normally, this way will be characteristic of books: in typical contexts the things referred to by ‘interesting book’ are things that are interesting to read. But this is not necessarily so. In some contexts a book whose inside was carved out to hide a gun can be called an interesting book even if reading it would be dreadfully boring. Like the modifier account, the proposal can explain substitution failures that are puzzling on the predicate view. Thus, ‘Sue is a good dancer’ and ‘Sue is a pianist’ does not entail ‘Sue is a good pianist’. Moreover, unlike the modifier account, this proposal actually provides an intuitively satisfying explanation. The reason the inference fails is not – as the modifier account would make us believe – that ‘pianist’ and ‘dancer’ are not co-extensive. Rather, the inference fails because it equivocates: the first premise and the conclusion ascribe different ways of being good to Sue.

⁴² Kennedy (2007).

Since I propose to interpret attributive uses of adjectives conjunctively I face problem with *privative adjectives*, like ‘fake’ or ‘retired’. But the problem isn’t really with the interpretation of adjectives: it does seem correct to say that if something is a fake tooth then there is a way in which it is fake (even if it is genuine gold) and that if someone is a retired professor then she is retired in a way (even if she continues to serve on an advisory board). Rather, the problem is with the nouns: a fake tooth is not really a tooth and a retired professor is no longer a professor. I don’t want to take a stance on how exactly the problem should be handled – one idea would be to have an operator which expands the range of things a noun refers to, and make sure that this operator is applied to ‘tooth’ or ‘professor’ before they combine with ‘fake’ or ‘retired’, respectively.

This move does not help with all words traditionally categorized as privative adjectives. Even if fake teeth are fake in a way and retired professor are retired in a way, it does not make any sense to say that utter confusion is utter in a way and that a former president is former in a way. ‘Utter’ and ‘former’ cannot occur predicatively, and these won’t yield grammatical semantic clauses of the form we are envisioning for all adjectives. To this concern I respond with a conjecture: these expressions differ so significantly from ordinary adjectives that they must belong to closed lexical categories.

There is a serious question whether adverbs are a separate lexical category or merely a subcategory of adjectives. One of the problems is that the category of adverbs is sprawling. As it is traditionally conceived, it includes adverbs of place (‘somewhere’, ‘here’, ‘home’), adverbs of time (‘during’, ‘now’, ‘while’), adverbs of frequency (‘usually’, ‘never’, ‘seldom’), and adverbs of purpose (‘because’, ‘since’, ‘so’). I will count these as closed category expressions.⁴³ The main reason one is inclined to believe that the rest form an open category is that we can derive manner adverbs from most adjectives by adding the suffix ‘-ly’ (etymologically related to ‘like’). There are significant distributional differences between ‘interesting’ and ‘interestingly’ but they may well be simply consequences of the fact that the former tends to modify NP’s, while the latter goes with other sorts of phrases. But there are also significant similarities – for example, the fact that they can both occur with the same degree heads; cf. ‘as interesting as.../as

⁴³ Given the heterogeneity of the traditional category my decision to include only open category items in major parts of speech may be significantly more revisionary in the case of adverbs than elsewhere.

interestingly as...’, ‘more interesting than.../more interestingly than...’, ‘too interesting/too interestingly’, etc.) In the end, I tentatively endorse the view that adjectives and adverbs are different lexical categories that have a lot in common.⁴⁴ They are both used primarily to modify, and they do so via conjunction. Modification yields a complex expression of the same category as the modified expression, so while adjectives are referring expressions, adverbs are predicates.

Adverbs: to be an adverb is to be an open category lexical variable that purports to predicate.

Just as ‘interesting’ refers to things that are interesting in a contextually given way, when one of these things is an event, ‘interestingly’ is predicated of it.

- (33) for all contexts c , for all x , ‘interestingly’ is predicated of x in context c if and only if x is interesting in way c^w

Thus, the close semantic connection between adjectives and the adverbs is analogous to the close semantic connection between gerunds and verbs. This accounts for the near-synonymy between sentences like (34) and (35).

- (34) Bill talked interestingly.
(35) Bill’s talking was interesting.

(34) says that there was an event whose Agent was Bill and predicates ‘talk’ and ‘interestingly’ of this event; (35) says that there was an event and refers to this by ‘talking’ and by ‘interesting’.⁴⁵

There are cases when adjectives behave adverbially and adverbs adjectivally, which can be captured nicely in this framework.

- (36) Martha is a foolish poker player.
(37) Martha foolishly played poker.

⁴⁴ Chapter 4.5 of Baker (2003) takes to opposite view.

⁴⁵ Whether these sentences mean the exact same thing is a tricky issue: it depends, among other things, on whether the possessive construction (usually regarded as a definite description) carries a semantic uniqueness implication that is missing from the first sentence. My own view is that the uniqueness implications of definite descriptions are pragmatic; cf. Szabó (2000, 2005).

Both of these sentences are ambiguous. (36) can mean either that Martha is a poker player who is foolish or that she is plays poker in a foolish way.⁴⁶ In the first reading, ‘foolish’ modifies ‘Martha’ – she is the one who must be among those who are foolish in a contextually given way. In the second, ‘foolish’ modifies the verb ‘play’, and hence behaves like an adverb: Martha’s playing poker is the thing said to be (generally) foolish.⁴⁷ (37) can either mean that Martha played poker in a foolish way or that it was foolish of her to play poker. In the first, ‘foolishly’ modifies ‘played’ – the event the sentence describes is said to be both a playing of poker and foolish in a contextually given way. In the second, ‘foolish’ modifies ‘Martha’, and hence behaves like an adjective: Martha is said to be foolish in a contextually given way for playing poker.⁴⁸

Sometimes adverbs show up in syntactic structure at a higher node: they modify clauses, rather than verb phrases. This happens, for example, in (38), which means something different from (34). One would use (38) to express that the fact that Bill talked was interesting, not that his talking was:

(38) Interestingly, Bill talked.

The adverb in (38) is called sentential because syntactically it attaches to the whole sentence, not to the verb phrase. But it does not appear that this difference is due to an ambiguity. In both (34) and (38) it is used to predicate of something that is interesting in a way – it’s just that according to the former this is an event and according to the latter it is a fact. The syntax and semantics of adverbial modification is a complex matter. In ‘Possibly, Bill talked’ we are not saying that a fact is possible but rather that a proposition is – even though in ‘Fortunately, Bill talked’ it is definitely the fact that Bill talked and not the proposition that Bill talked that is said to be fortunate. Moreover, in some cases – for example, in ‘Frankly, Bill talked’ – the fact that is said to be frank is not the fact expressed by the sentence to which the adverb attaches, but rather the

⁴⁶ The observation that there is this ambiguity is due to Larson (1998).

⁴⁷ ‘Play’ does not occur on the surface in (34) but is presumably part of the semantic contribution of the derived noun ‘player’.

⁴⁸ See Szabó (2003) for an attempt to provide a semantic analysis for such subject-centered occurrences of adverbs.

fact that of asserting that sentence by the speaker. The semantics will eventually need to account for all this. But whatever the account will look like, it should, I suggest, should not complicate the simple predicative lexical meaning of adverbs.

8. Closing

One of the many reasons traditional semantic criteria for identifying major parts of speech are rejected nowadays is that they force us to draw dubious ontological distinctions. Mark Baker used the following triad to illustrate the point:⁴⁹

- (39) Chris has hunger.
- (40) Chris hungers.
- (41) Chris is hungry.

There is no clear difference in what these sentences mean.⁵⁰ But according to the traditional view the noun ‘hunger’ designates some sort of abstract object, the verb ‘hungers’ is true of concrete mental states, and ‘hungry’ picks out a quality. Baker thinks this is gratuitous and recommends that we should view the differences among these words as purely syntactic.

But is it really plausible that ‘hunger’, ‘hungers’ and ‘hungry’ are synonyms? I grant that they designate the same things: states of hunger. But not all differences in meaning are derived from differences in designation. Semantic theories acknowledge a distinction between constant and variable designation: when Chris introduces himself by ‘I am Chris’ he designated himself twice without using synonyms. Semantic theories also acknowledge a distinction between reference and satisfaction: when Chris boasts ‘I am tallest in my class’ he again designated himself twice but used expressions that perform this task in different ways.

I have argued that there is reason to think that these two distinctions can be used to semantically define the four major parts of speech. Nouns, verbs, adjectives and adverbs are the broadest open lexical categories. Nouns and verbs are constants – their interpretation is insensitive to linguistic

⁴⁹ Baker (2005): 292.

⁵⁰ He could have added ‘Chris exists hungrily’ which, on its literal interpretation, means roughly what any of (37) – (39) do.

or extra-linguistic context. Adjectives and adverbs are variables – they perform their semantic function only when context supplements a way in which they apply. The semantic function of nouns and adjectives is reference – to call things something or other. Verbs and adverbs have a different job – they are satisfied by things.

open lexical categories	constant	variable
referring expression	noun	adjective
predicate	verb	adverb

I started with the observation that grammar and logic both strive for formal explanations and that theoretical parsimony would suggest that the form of sentences they appeal to is closely related. If so, grammatical and logical categories must line up to a considerable degree. I have argued that the narrow open categories of the lexicon – classes of lexical items defined as preserving well-formedness or validity by substitutions excluding closed category items – plausibly do. Unfortunately, narrow categories are too fine-grained to be useful. But if the broadest lexical categories typical explanations of well-formedness appeal to – that of noun, verb, adjective, and adverb – are semantically characterizable we can use them in our explanations of validity as well.

Whether we should abandon the standard gerrymandered type-theoretic view of lexical categorization in favor of this suggestion depends on how well it can serve within comprehensive semantic theorizing. If it turns out that attempts to use base clauses of the sort I recommended within semantics lead to excessive complications in grammar or logic the view will not be taken seriously. My hope, of course, is that things will go differently.⁵¹

⁵¹ I thank audiences at Oxford University, at Rutgers University, and at Universität Erfurt for questions, comments, and discussion. Special thanks to Cian Dorr, Tamar Szabó Gendler, David Liebesman, Paul Pietroski, Jonathan Schaffer, and Anna Szabolcsi.

References

- Baker, M. (2003) *Lexical Categories: Verbs, Nouns, and Adjectives*. Cambridge: Cambridge University Press.
- Bar-Hillel, Y. (1953) 'A Quasi-Arithmetical Notation for Syntactic Description.' *Language* **29**: 47 – 58.
- Bowers, J. (1993) 'The Syntax of Predication.' *Linguistic Inquiry* **24**: 591 – 656.
- Bowers, J. (2001) 'Predication.' In M. Baltin and C. Collins eds., *The Handbook of Contemporary Syntactic Theory*, Oxford: Blackwell.
- Burge, T. (2007) 'Predication and Truth.' *Journal of Philosophy* **104**: 580 – 608.
- Chomsky, N. (1981) *Lectures on Government and Binding*. Dordrecht: Foris.
- Croft, W. (1991) *Syntactic Categories and Grammatical Relations*. Chicago: Chicago University Press.
- Davidson, D. (1967) "The Logical Form of Action Sentences." Reprinted in *Essays on Actions and Events*. Oxford: Oxford University Press, 2001, pp. 105 – 21.
- Frege, G. (1892) 'On Concept and Object.' *Vierteljahrsschrift für wissenschaftliche Philosophie*, **16**. Reprinted in B. McGuinness ed., *Collected Papers on Mathematics, Logic, and Philosophy*. Oxford: Basil Blackwell, 1984, pp. 182 - 94.
- Furth, M. (1968) "Two Types of Denotation," in *Studies in Logical Theory*, Cambridge: Blackwell.
- Gleitman, L. and E. Wanner (1982) 'Language Acquisitions: The State of the State of the Art.' In E. Wanner and L. Gleitman eds., *Language Acquisition: The State of the Art*. Cambridge: Cambridge University Press.
- Grimshaw, J. (1990) *Argument Structure*. Cambridge, MA: MIT Press.
- Gruber, J. (1965) *Studies in Lexical Relations*. PhD Dissertation, MIT.
- Heim, I. and A. Kratzer (1998) *Semantics in Generative Grammar*. Oxford: Blackwell.
- Kennedy, C. (2007) 'Vagueness and Grammar: The Semantics of Relative and Absolute Gradable Predicates.' *Linguistics and Philosophy* **30**: 1 – 45.
- Larson, R. (1998) 'Events and Modification in Nominals.' In D. Strolovitch and A. Lawson eds., *Proceedings from SALT VIII*, 145 -68. Ithaca, NY: CLC Publications.
- Larson, R. and G. Segal (1995) *Knowledge of Meaning: An Introduction to Semantic Theory*. Cambridge, MA: MIT Press.
- Lindström, P. (1966) 'First-order predicate logic with generalized quantifiers.' *Theoria* **32**: 186–195.
- MacFarlane, J. 'Logical Constants.' *The Stanford Encyclopedia of Philosophy* (Fall 2009 Edition), E. N. Zalta (ed.), <<http://plato.stanford.edu/archives/fall2009/entries/logical-constants/>>.
- May, R. (1985) *Logical Form: Its Structure and Derivation*. Cambridge, MA: MIT Press.
- Montague, R. (1970) 'Universal Grammar.' *Theoria*, **36**. Reprinted in R. H. Thomason ed., *Formal Philosophy*. New Haven: Yale University Press, 1974, pp. 222 – 46.
- Murphy, L. (2010) *Lexical Meaning*. Cambridge: Cambridge University Press.
- Parsons, T. (1990) *Events in the Semantics of English*. Cambridge, MA: MIT Press.
- Rothschild, D. and G. Segal (2009) 'Indexical Predicates.' *Mind and Language* **24**: 467 – 93.

- Russell, B. (1918) *The Philosophy of Logical Atomism*. *Monist* **28, 29**. Reprinted in *Logic and Knowledge*, London: Allen and Unwin, 1956, pp. 177 – 281.
- Sainsbury, M. (2005) *Reference without Referents*. Oxford: Oxford University Press.
- Schein, B. (1993) *Plurals and Events*. Cambridge, MA: MIT Press.
- Stanley, J. (2002) ‘Nominal Restriction.’ In G. Peters and G. Preyer, eds., *Logical Form and Language*, pp. 321- 44. Oxford: Oxford University Press.
- Stanley, J. and Z. Szabó (2000) ‘On Quantifier Domain Restriction.’ *Mind and Language* **15**: 219 – 61.
- Strawson, P. (1950) ‘On Referring.’ *Mind*, **59**. Reprinted in *Logico-Linguistic Papers*. London: Methuen, 1971, pp. 1 - 27.
- Szabó, Z. G. (2000) ‘Descriptions and Uniqueness.’ *Philosophical Studies* **101**: 29 – 57.
- Szabó, Z. (2001) ‘Adjectives in Context.’ In I. Kenesei and R. M. Harnish eds., *Perspectives on Semantics, Pragmatics, and Discourse*. Amsterdam: John Benjamins, pp. 119 – 146.
- Szabó, Z. (2003) ‘On Qualification.’ *Philosophical Perspectives* **17**: 385 – 414.
- Szabó, Z. (2005) ‘The Loss of Uniqueness.’ *Mind*. (2005) **114**: 1185 – 1222.
- Szabó, Z. (2012) ‘Against Logical Form.’ In G. Preyer ed., *Donald Davidson on Truth, Meaning, and the Mental*. Oxford: Oxford University Press, pp. 105 – 126.