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Abstract Objects and the Core-Periphery Distinction in the Ontological and the Conceptual Domain of Natural Language

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Introduction

Abstract objects such as properties, numbers, and propositions have been a central topic of philosophical controversy since antiquity. While there are a range of philosophical arguments for and against abstract objects, philosophers have also appealed to natural language, generally arguing that abstract objects are well-reflected in natural language, in what appear to be abstract terms, such as *happiness*, *the number of planets* or *that*-clauses. This has given rise to the widespread view that natural language involves a rich and philosophically controversial ontology of abstract objects.

A systematic linguistic investigation, based on a much greater range of data, whether and how natural language (or rather English) involves an ontology of abstract objects was the topic of my 2013 book *Abstract Objects and the Semantics of Natural Language*. The book rejects the common view that natural language permits pervasive reference to abstract objects and instead endorses what I will now call *the Abstract Objects Hypothesis*:

(1) The Abstract Objects Hypothesis

Natural language does not involve reference to abstract objects in its ontological core, but only in its ontological periphery.

For example, the book argues that *happiness* is not a term standing for an abstract property object, but rather a plural term, referring to the all the particular happiness features (tropes) at

once. *The number of planets*, the book argues, does not stand for an abstract number, but rather for a number trope (the numerical aspect of the planets).¹ *That*-clauses moreover are not considered referential terms at all standing for objects.

Crucial in the formulation of the Abstract-Objects Hypothesis is the relativization to a core-periphery distinction. This is an important distinction that has always been made implicitly when philosophers appealed to natural language in support of a philosophical view, but has never been articulated and theoretically elaborated. Whenever philosophers (and linguists) appeal to natural language to motivate an ontological notion or view, they are careful to only draw on expressions from the ontological core of language, not its periphery. Thus, it is considered legitimate to appeal to the existence in English of expressions like *happiness*, *the number of planets*, and *that it is raining* when motivating properties, numbers, and propositions as abstract objects, but not expressions like *the property of being happy*, *the number eight*, and *the proposition that it is raining*, that is, abstract terms particular to philosophical discourse, but also legitimate for use by any competent speaker of English.

Intuitively, the ontological core consists in expressions or uses of expressions not involving ontological reflection, whereas the ontological periphery consists of expressions or uses of them involving ontological reflection. The distinction between core and periphery reconciles the fact that only certain sorts of expressions or uses of expressions are considered indicative of the ontology implicit in natural language with the fact that natural language contains expressions that can be used to make explicit reference to abstract objects and permits the introduction of new expressions or uses of expressions for that purposes.

An important feature of the core-periphery distinction for ontology is that there appear to be significant constraints as to what parts of language can lead to a use in the periphery. In particular, the ontological core-periphery distinction appears to be structurally anchored, with only full nouns freely being able to lead to a use in the periphery and not, for example, morphological features and verbal or functional categories. This means that the ontological core-periphery distinction is not just a somewhat elusive distinction based on mental acts or attitudes, but is also anchored in the structure of language.

Natural language ontology with its core-periphery distinction goes along with a particular conception of ontology. First, the ontology reflected in language, the subject matter of natural language ontology, should be viewed not as an ontology of real objects (which would be the subject matter of foundational metaphysics, as Fine 2017 would call it). Rather it should be

¹ For the notion of a trope as a particularized property see Williams (1953).

considered an ontology of appearances (Fine 2017), consisting of objects that serve as values of referential noun phrases and bear a range of properties, but that may be merely conceived objects. Second, the ontology reflected in language should not be viewed as consisting just of a given domain of entities and their associated categories, but as an ontology that allows for considerable flexibility and expansion. In particular, it should include ontological operations for the introduction of new entities often going along with particular syntactic constructions.

This sort of expandability matches that of the lexical-conceptual domain of language, which displays a similar core-periphery distinction. Thus, it has been argued that only certain concepts allow for ‘conceptual engineering’, and again, there appear to be structural constraints to what extent meanings can be modified or expanded on non-ordinary, philosophical uses of language.

Core-periphery distinctions have also been made for syntax and for phonology. However, those distinctions are entirely different from the ones needed for the ontological and the conceptual domain of language.

The overall aim of the paper is to elaborate the ontological core-periphery distinction in the context of the cognitive ontology reflected in natural language, focusing on apparent reference to abstract objects. The paper will start by laying out standard views about abstract objects and presenting the background of natural language ontology and in particular the notion of a language-related, constructional ontology it involves. It will then elaborate core-periphery distinctions for the ontological and the conceptual domains of natural language and briefly discuss distinctions of the same name that have been made in generative syntax and phonology. Finally, it gives a concise presentation of the reanalyses in Moltmann (2013a) of apparent abstract terms in the core of language and presents a way to make sense of the semantics and ontology of abstract terms in the ontological periphery. In an appendix, the paper will discuss apparent problems for the Abstract Objects Hypothesis.

1. Abstract objects, natural language, and the core-periphery distinction

There are a range of philosophical motivations for abstract objects of the various sorts as well as philosophical arguments against them. Thus, properties have been considered the basis for relations of resemblance and the individuation of objects; propositions have been considered important as the sharable contents of thought; and numbers, sets and other mathematical objects are central in the ontology of mathematics. Yet abstract objects are also considered problematic in that they are not part of the empirical world and in particular cannot enter

causal relations and act as the objects of perception, raising the issue of how we can have epistemic access to them. Moreover, it is unclear how abstract propositions can be grasped and act as the content of mental attitudes. In addition to providing metaphysical and epistemological arguments for and against abstract objects, philosophers have also drawn on natural language, generally to give support for abstract objects (but also sometimes to argue against them).

In analytic philosophy, this is particularly the case in the work of Frege and Neofregeans (Wright 1986, Hale 1983), who take the syntactic category of referential noun phrases (singular or referential terms) to be indicative of objecthood ('an object is what a referential term may stand for'). On their view, properties, propositions, and numbers are generally considered objects as there appear to be referential noun phrases for them (*the number of planets / eight, wisdom, that-clauses like that it is raining*). The view would extend to pure quotations (as in '*Red*' means '*rouge*'), which are commonly taken to involve the formation of referential terms standing for expression types.

But the involvement of objects is not limited to the role of semantic values of referential terms. Objects may also just act as implicit arguments of predicates. Thus, degrees are commonly regarded as implicit arguments of gradable adjectives.²

Given apparent abstract terms such as *wisdom, the number of planets, and that-clauses*, it has become a widespread view that natural language involves pervasive reference to abstract objects, a view which led some philosophers skeptical about abstract objects to reject language as a guide to ontology.

In my own work (Moltmann 2013a), I have rejected this common view about the involvement of abstract objects in the semantics of natural language. Instead I have argued for the view that natural language does not involve reference to abstract objects in the relevant part of natural language, its ontological core, but only its periphery (the Abstract Objects Hypothesis). Relevant referential expressions that were generally considered abstract terms are now analysed differently. Instead of referring to abstract objects, they are either no longer considered referential terms or else are considered terms involving reference to something other than single abstract objects, say, pluralities of particulars, particularized properties (tropes), or variable objects with concrete entities as manifestations.

Of course, there are natural language terms that cannot be regarded other than as terms standing for abstract objects, such as *the property of being wise, the number eight, the*

² Degrees can also be made explicit as in *ten meters tall*, or so the common view.

proposition that it is raining, and various terms that philosophers are using so as to make reference to them. But such terms or uses of terms will be part of the ontological periphery, not the ontological core of language (and will be discussed in greater detail in Section 4).

The core-periphery distinction is indispensable when investigating the ontology reflected in language, and in fact it is a distinction that has been presupposed by all philosophers throughout the history of philosophy that appealed to natural language in support of a philosophical view. Thus, Frege and Neo-Fregeans knew to stay away from terms like *the property of being wise*, *the proposition that it is raining*, and *the number eight*, being aware that they are unsuited to make their point. Instead they drew on expressions like *the number of planets* and *eight* (Frege), *wisdom* (Hale 1983), and *that*-clauses (all philosophers arguing for propositions). Philosophers of course also stay away from expressions specific to philosophical discourse ('technical terms') and philosophical, that is, non-ordinary uses of natural language expressions, involving semantic values from a particular philosopher's domain. Without a core-periphery distinction the ontology described by any philosophers' theory would be part of the ontology of language, undermining the pursuit of natural language ontology entirely.

It is an undisputable fact, though, that natural language permits the introduction of expressions or uses of expressions meant to have semantic values within a particular philosopher's ontological theory -- despite attempts by ordinary language philosophers to sanction such uses. Thus a philosopher can introduce a particular notion of existence, truth, or parthood and use the nouns *existence*, *truth*, and *parthood* to be associated with such a notion rather than whatever the ordinary meaning of the expression may be from which such nouns are derived (*exist*, *true*, *part*). Such uses are not illegitimate, but rather are made possible by a fundamental feature of language or rather the conceptual and ontological structure going along with it, namely what I will call *expandability*. Expandability consists in the possibility of conceptual modification or ontological expansion, going along with a non-ordinary use of natural language expressions, with the introduction of new expressions, or with particular constructions already present in the language (such as constructions of the sort *the property of being happy*).

Expandability of the conceptual and ontological domain associated with language allows for a form of creativity in more of the standard understanding of the term than the creativity of language use in the Chomskyan sense, which consist in the ability of a speaker of a language to produce and understand an indefinite number of new expressions against the background of limited experience. Creativity in the conceptual and ontological domain manifests itself in the

introduction of new concepts or objects against the background of reflection (as opposed to implicit acceptance).³

2. Natural language ontology

The following is a brief outline of the discipline whose subject matter is the ontology of natural language, natural language ontology.

With its referential noun phrases, which take entities as semantic values as well as with its lexical predicates and constructions that involve entities in other ways, natural language reflects an ontology, a range of entities, with their various properties and relations to each other. This ontology is the subject matter of a particular branch of metaphysics, that of natural language ontology. More specifically, natural language ontology is part of descriptive metaphysics in Strawson's (1959) sense or what Fine (2017) calls 'naïve metaphysics'.⁴ Descriptive metaphysics has as its subject matter the ontology reflected in our ordinary judgments (or shared conceptual scheme, as Strawson would put it). Natural language ontology has as its subject matter the ontology reflected in linguistic intuitions, that is, judgments about the acceptability or grammaticality of natural language sentences and constructions.

What is important about descriptive metaphysics is that it is not about the ontology of what there really is. This is instead the subject matter of a different branch of metaphysics, what Fine calls 'foundational metaphysics'.⁵ Descriptive metaphysics and natural language ontology in particular concerns itself with how things appear, without addressing the question of whether they are real (which is to be addressed only by foundational metaphysics). For natural language ontology; this means that no foundationalist consideration should come into play when positing objects as semantic values, such as assumptions as to whether those objects really exist and what they may be reduced to. More important than whether semantic values of referential noun phrases are actually existing objects is what sorts of properties they

³ 'New' in the case of objects in the ontological domain means objects that are not yet part of the domain of interpretation of the language, whether the objects are real or merely conceived (a difference that plays no role for natural language ontology). See Section 2.

⁴ Fine's (2017) term 'naïve metaphysics' thus is misleading, and 'descriptive metaphysics' a better term to use for the branch of metaphysics that comprises natural language ontology.

⁵ For Strawson (1959), descriptive metaphysics rather contrasts with what he calls 'revisionary metaphysics'. The aim of revisionary metaphysics, for Strawson, is to conceive of a better ontology than the one we ordinarily accept. (Strawson does not specify further how 'better' is supposed to be understood.)

may have and what relations they stand in to other objects, as is reflected, at least to an extent, in the applicability of types of natural language predicates. The domain of objects in the ontology of natural language thus may include merely conceived objects besides objects that happen to be actual ones. For the purpose of natural language ontology, the difference will not matter. (The indifference of natural language ontology regarding real existence will also be important for how to make sense of the expandability of the ontological domain of the language through technical or philosophical discourse in Section 4.)

The subject matter of natural language ontology is not the ontology that ordinary speakers (non-philosophers) naively accept when thinking about what there is. The latter is the subject matter of folk metaphysics, not natural language ontology. What speakers accept when they reflect does not matter for natural language ontology. Natural language ontology rather deals with the ontological categories, notions, and structures that are implicit in language whether or not speakers would accept them upon reflection. The ontology of natural language thus is better to be characterized as the ontology that a speaker *implicitly accepts* when using the language (Moltmann 2017, to appear a), and as such is distinguished from both the reflective ontology of ordinary speakers as well as philosophers and the ontology of what there really is.

Natural language ontology is not just a new discipline (as a branch of both metaphysics and linguistics), but in a way was pursued by philosophers throughout the history of philosophy whenever philosophers drew on natural language in support of a metaphysical notion or view. Philosophers when appealing to natural language, though, appealed to only certain types of linguistic data and not others, and thus implicitly followed a particular methodology -- the sort of methodology that also guides natural language ontology as an emerging contemporary discipline that is part of both descriptive metaphysics and linguistics (semantics). Thus metaphysical statements of the sort *there are properties*, *there are numbers* etc are not indicative of the ontology reflected in natural language. By contrast, sortal presuppositions of lexical predicates, for example, are, as are sortal restrictions associated with particular types of noun phrases or nominalizations.

An important feature of the ontology of natural language is that it involves not so much a particular domain of objects and their associated ontological categories, but ontological operations that serve the introduction of new objects. In that sense it is a *constructional ontology* (Fine 1991). To an extent, the ontological operations go along with the compositional semantics of particular syntactic constructions. I will mention some of those constructions and their correlated operations (though there is not generally a unanimous view as to the semantics they involve). First, the introduction of a trope (particularized property)

goes along with the construction NP's N_A , where N_A is the nominalization of the adjective A, as in *John's happiness*, *Socrates' wisdom*, *Mary's courage*. On a common view, formation of a kind goes along with bare (determinerless) plural and mass nouns in English (*giraffes are rare*, *water is transparent*). On an equally common view, the construction of definite plurals (*the students*) goes along with the introduction of a sum composed of the individuals that fall under the corresponding singular noun.⁶ Finally, definite NPs with a functional noun as head or modified by an intensional relative clauses go along with the introduction of a variable object, an object that has potentially different concrete manifestations at different times and perhaps (possible) situations. Examples are *the president of the US* (as with *is elected every four years*), *the water in the pool* (as with *decreased*), and *the book John needs to write* (Moltmann 2013a). The linguistic ability to use such constructions goes along with the implicit acceptance of the relevant ontological operation, and an actual use of such a construction goes along with the implicit acceptance of the output of such an operation.

In addition to syntactic constructions, there are syntactic categories and features that appear to go along with categories of objects (to give two simplified examples: verbs with events, adjectives with tropes), and syntactic knowledge of them goes along with the implicit acceptance of those ontological categories.

The constructional ontology involved in natural language goes along with more differentiated forms of ontological acceptance. There will not just be a single notion of acceptance, acceptance of the entities in the domain of the ontology. In addition, there will be a notion of acceptance of ontological operations, and that with or without acceptance of the output of such operations. Implicit acceptance of an ontological operation with its output then needs to be distinguished from the reflective acceptance that may or may not apply to the output of an ontological operation that goes along with a particular syntactic construction. Reflective acceptance would then lead from the ontological core to the periphery of language.

3. The core-periphery distinction in ontology and in semantics

3.1. The core-periphery distinction in natural language ontology

⁶ In the latter two cases, there are also arguments, however, that the NPs plurally refer (to modalized pluralities or actual pluralities) that is refer to several individuals at once, rather than leading to the composition of a new entity (Moltmann 2013a).

An important distinction differentiating between linguistic data indicative of the ontology of natural language and data not indicative of it is the distinction between the ontological core and periphery of language. The distinction is reflected in the sorts of data that contemporary philosophers or linguists know to choose when they pursue natural language ontology, and it is reflected in the sorts of data that philosophers throughout history knew to choose when they in fact engaged in natural language ontology. It is a distinction that is presupposed just as much by the appeals to natural language that philosophers considered appropriate throughout history and by contemporary pursuits of natural language ontology by linguists and philosophers. It is thus a distinction that is central to natural language ontology as a historical practice and an emerging discipline.

Most importantly, full nouns conveying ontological categories (sortals) are generally not taken to be indicative of the ontology of natural language. The fact that nouns like *property*, *proposition*, *number*, *trope*, *kind*, *sum*, etc can be used, legitimately, in English to refer to entities and quantify over them is generally not taken as evidence that the ontology implicit in language includes objects of such categories. Moreover, what I call ‘reifying terms’, noun phrases that are formed with sortal nouns of the sort *the number eight*, *the proposition that S*, or *the truth value true*, have generally not been taken to be indicative of the ontology of natural language.⁷ Thus, Frege did not motivate numbers as objects appealing to the presence of the construction *the number eight* and he did not motivate truth values as objects by appealing to *the truth value true* (but rather by considerations regarding embedded sentences and the sense-reference distinction across categories). Yet, reifying terms with a selected set of sortals are fully productive and thus lead to referential terms standing for objects, the sorts of objects that should fall under the sortal that is part of the construction. What then is the difference to the constructions discussed in the last section, which involve ontological operations yielding composite or derivative objects (tropes, kinds, pluralities, variable objects), which would fall under suitable sortals. In both cases we have complex syntactic constructions, but only in the second case, will the objects that are the output of the operation, count as part of the ontology of natural language. The reason is the involvement of a sortal in the first case, which makes the construction be part of the periphery and its outputs not be part of the ontology implicit in language. In the second case, the outputs are *implicitly accepted* by anyone making use of the construction. In the first case, the construction itself involves

⁷ See Moltmann (2013a, Chapter 6) for a discussion of ‘reifying terms’. Reifying terms divide into close appositions such as *the number eight* and *the truth value true* and constructions of the sort *the proposition that*, *the fact that S*, *the property of being wise*.

explicit recognition of the output as an object falling under the respective sortal, and thus a reflective ontological act. Even if the construction itself with the ontological object-introducing operation is part of the core of language (and thus is implicitly accepted), the use of the construction with the involvements of an act of ontological recognition (or reflection) makes the output be part of the periphery, that is, outside of the realm of implicit acceptance.

The feature driving the ontological core-periphery distinction is thus metaphysical reflection: expressions (or uses of expressions) belong to the ontological periphery if their use involves some degree of ontological reflection, as would go along with the use of a sortal.

Note that the core-periphery distinction is not a strict, but a somewhat gradual distinction. While sortals like *set*, *sum*, *trope*, and *proposition* will require not just categorial recognition, but some technical or philosophical knowledge, this is presumably not so for *fact* (*the fact that S*), *state* (*the state of John being happy*), and perhaps *property*.⁸

The reflection that is characteristic of the periphery goes along with the use of full sortal nouns, which involves the explicit recognition of an object as belonging to a particular ontological category. By contrast, there are linguistic categories that convey ontological categories, but do not involve reflection and do not permit conceptual modification on a non-ordinary use. An example is plural morphology. Whatever notion of plurality it may in fact involve, that notion could not possibly be altered on a particular use to accommodate a particular philosophical view of plurality. Also the object-introducing constructions mentioned in the last section are of that sort, that is, definite NPs that introduce tropes, bare plurals and mass nouns that introduce kinds, and definite NPs that introduce variable objects. The use of those constructions does not permit altering the way the so introduced objects are conceived.

The ontological periphery comprises part of the ontology that is reflected in natural language as well as particular construction types, expressions, and uses of expressions. As such it also includes ‘technical terms’, expressions introduced within a particular philosopher’s theory. It includes certain sorts of uses of expressions, namely just the non-ordinary, ‘philosophical’ uses of expressions that have been the subject of critique of ordinary language philosophy (Wittgenstein, Ryle, Malcolm). Rather than dismissing such uses as illegitimate, from the present perspective they do have their proper place, relying on a

⁸ There are also other sorts of terms that ordinary speakers use that appear to refer to abstract object. One example are number terms of the sort *the eight*, which clearly are terms referring to numbers as abstract objects, but certainly are used by ordinary speakers, even children (though such number terms are rather limited, just up to *the twelve* in my language). (*The eight* arguably is also a close apposition like *the number eight*, but involving a silent noun NUMBER, see Fn 5.)

legitimate expandability of the semantics and ontology associated with language. If expressions are used in a non-ordinary way to convey metaphysical notions, then those notions will be part of the ontological periphery of the language, not its core.

One issue the ontological core-periphery distinction raises is whether the core should represent the universal part of the cognitive ontology reflected in natural language as opposed to an ontology that would be specific to particular individuals, groups of individuals, or points of views. We have seen that part of the (core) ontology of natural language goes along with the semantics of a particular syntactic construction. There is no particular reason why syntactic constructions that serve the composition or introduction of a new entity should be shared among all languages. This means that particular ontological operations that are part of the core ontology of a particular language need not be universally shared. But it should be only in the ontological core of languages that universally shared features of a cognitive ontology can be found.

3.2. The core-periphery distinction in semantics and philosophical conceptual theory

While the core-periphery distinction is indispensable for pursuing natural language ontology, it is a distinction that may be drawn and has been drawn also for other domains associated with language, in particular lexical/conceptual meaning, syntax, and phonology. However, only in the case of lexical-conceptual domain is the distinction roughly the same as the ontological core-periphery distinction. In what follows, I will briefly discuss the distinctions in those other language-related domains.

Like the ontology of natural language, lexical meanings in natural language do not form a rigid domain, but rather permit a great range of flexibility and polysemy, which has given rise to theories according to which the lexicon includes operations on meanings generating other meanings (the theory of the Generative Lexicon of Pustejovsky 1995). The flexibility that lexical meanings display also consists in the possibility for a language user to precisify or otherwise modify a given lexical meaning. When a philosopher engages in such modification of conceptual meaning for philosophical purposes, this is what is called ‘conceptual engineering’ in recent philosophical discussions.⁹

⁹ Conceptual engineering has been advocated as a replacement of the standard approach in analytic philosophy, conceptual analysis (Cappelen 2018).

Engaging in conceptual engineering is not a privilege for philosophers, of course; the very same sort of non-ordinary use of expressions and introduction of a new or modified use of an expression is available to any competent speaker of the language.

Like ontological operations that lead from the ontological core to the periphery, conceptual engineering is a legitimate operation of expansion of the domain of conceptual meaning. It thereby also gives rise to a core-periphery distinction. Let me call this *the semantic core-periphery distinction*, a distinction roughly between what one may call ‘ordinary meaning’ and ‘non-ordinary meaning’.

There may be another, more important core-periphery distinction in the conceptual domain, based on potential limits to conceptual engineering (Chalmers 2011, Eklund 2015, Cappelen 2018). Concepts that resist conceptual engineering are discussed as ‘bedrock concepts’ by Chalmers (2011) and as ‘conceptual fixed points’ by Eklund (2015). These are concepts so fundamental that they permit no modification in the context of a particular philosophical view. A distinction between a core consisting of such concepts and a periphery would define a fairly wide periphery of conceptual meaning. Such a distinction, which I will call *the conceptual core-periphery distinction*, would consider the core a universal part of the human conceptual system, which would match a potential universal part of the core ontology of a given natural language.

Limits to conceptual engineering do not just concern concepts as such. Limitations to legitimate modifications of conceptual meanings can also be viewed from a more linguistic point of view. For example, it is reasonable to expect that it is not available for the meaning of light verbs (*have, be, make*), morphological categories (plural, singular, tense, mood), functional categories (such as tense, mood), thematic roles, and syncategorematic expressions (*and, or, if-then*).¹⁰ Moreover, there is evidence that it depends on the syntactic category of expressions to what extent it is applicable. Thus, there is a striking difference between the meaning of the verb *exist* and the meaning of the nominalization *existence*. Many philosophers, such as van Inwagen (2014) take existence to be a notion that trivially applies to everything there is, or at least every actual thing. Their use of the noun *existence* would be perfectly legitimate for talking about that notion (as would be the use of *existence* by an ordinary person that, for example, asks a philosophical question about ‘the existence of everything there is’). However, in natural language, the predicate *exist* is subject to strict

¹⁰ In generative syntax, this should generally hold for what is called functional categories, as opposed to lexical categories.

conditions on the type of entity to which it can apply: it applies to material and abstract objects, but not to events (Hacker 1982, Cresswell 1986, Moltmann 2013c, 2018):

- (1) a. The house still exists.
 b. The largest prime number does not exist.
- (2) a. ??? The rain still exists.
 b. ??? The protest existed yesterday.

Events do not ‘exist’, but ‘take place’, ‘happen’, ‘occur’, or ‘last’. The reason why *exist* exhibits such restrictions, arguably, is that *exist* has primarily a time–relative meaning and conveys the complete presence of an entity throughout a time (Moltmann 2013c, 2018). By contrast, the verb *existence* can be used without imposing any restrictions on the entities it applies to (as in *the existence of everything there is*). What is important is that the verb *exist* cannot be used so as to convey the unrestricted notion of existence. The resistance of *exist* to events is robust: even a philosopher convinced of the univocality of the concept of existence (such as van Inwagen) will be unable to apply *exist* to events.¹¹ This appears to be a reflection of the semantic core-periphery distinction: the meaning of the verb *exist* belongs to the semantic core of language, whereas at least one of meanings of the noun *existence* belongs to the semantic periphery. It is also the reflection of the ontological core-periphery distinction: whenever an expression conveying a metaphysical notion undergoes legitimate conceptual modification, this involves a shift from the semantic as well as the ontological core of language to its semantic as well as its ontological periphery.¹²

The semantic core-periphery distinction is very similar to the ontological core-periphery distinction. The semantic core involves concepts that are implicit in the ordinary use of language, that is, that speakers implicitly accept when they use language in the ordinary way.

¹¹ There also are various sorts of philosophers that have particular views about existence, for example that only fundamental or mereologically primitive entities exist. However, as long as the sortal restrictions of *exist* are respected, such views can attach to the use of the verb as well.

¹² Somewhat similar observations can be made about the adjective *true* and the nominalization *truth*. Philosophers have various different views about truth and can use the nominalization *truth* to convey their respective concept of truth. Philosophers (and perhaps non-philosophers) also generally have the view that representational mental objects (with a mind-world direction of it) are truth bearers. However, *true* fails to apply to some of the objects that one would think are truth bearers, for example impressions and speculations (an impression cannot be said to be true or false, and neither can a speculation) (Moltmann 2018). Of course, there may be various reasons (not just conceptual fixed points) why *true* exhibits additional restrictions in relation to the nominalization *truth*. But in any case, *truth* conveys a reflective notion that is not the same as conveyed by *true*.

The semantic periphery involves doing something to ordinary conceptual meanings ('conceptual engineering') and thus adding to the given domain of lexical meaning. The ontological periphery was characterized as involving ontological reflection, and thus adding to the ontological domain that a speaker accepts when using the language. The close connection follows from the fact that is concepts are metaphysical concepts, they also belong to the ontological domain, and conceptual engineering would send them from the ontological core to the ontological periphery.¹³

Another feature that the semantic and ontological core-periphery distinctions share besides a distinction between implicit acceptance and reflection distinction is a form of true creativity that language, with its conceptual and ontological domain, permits, with choices to be made in response to particular demands or interests, quite unlike the creativity Chomsky attributed to language, which involves applying a given set of rules to produce utterances of new sentences or expressions. Creativity in the latter sense is a general feature of the morphosyntax of language, allowing for the production of an infinite number of new sentences and words. But this is not the sort of expansion that leads to a periphery. The conceptual and ontological structures associated with language allow for creativity that goes along with distinctive cognitive acts, leading to a periphery in the relevant sense.

3.3. The core-periphery distinction in syntax and phonology

Chomsky (1981, 1989, 1998) introduced a core-periphery distinction for syntax. Roughly, those parts of a natural language are considered in the periphery that are anomalous or 'added on' from influences from other languages, whereas the core of language reflects universal grammar.¹⁴

Chomsky's distinction is in no way co-extensive with the semantic and ontological core-periphery distinctions. Lots of types of expressions that may be or would be part of the conceptual or ontological periphery will clearly be part of the syntactic core of language, including nominalizations and reifying terms. Moreover, the ontological and semantic peripheries include mere uses of expressions, which on another use would be part of the core. One intuitive feature, though, that Chomsky's distinction shares with the ontological and

¹³ Moreover, the switch from the adjective to the noun goes along with reification of a concept (adjective) as an object (noun). So here it is not just concept modification, but also reification, and thus an ontological operation.

¹⁴ See also Yang (2016) for a thorough recent discussion of the core-periphery distinction in syntax.

semantic core-periphery distinctions is being “additional” with respect to the core. The ontological and semantic peripheries involve additional cognitive acts besides implicit acceptance of the domain of the core, acts of philosophical reflection of some sort. In addition, the two sorts of core-periphery distinctions are driven by an interest in universal features of linguistic or cognitive systems.

There is another core-periphery distinction that is being used in generative grammar, namely in phonology. According to that distinction, the lexicon has a core-periphery organization according to degrees of assimilation/integration of the vocabulary (Îto/Mester 1995a, b). Here the core-periphery distinction is not a binary distinction, but a gradual one, with different types of items being more or less in the periphery or core. The phonological core-periphery distinction is also based on the feature of natural language being expandable, but here allowing for the vocabulary to be expanded by importing items from other languages. The semantic and ontological peripheries, by contrast, involve expansion from within the conceptual and ontological system.

4. Abstract objects and the core-periphery distinction: A potential universal of natural language ontology

With the distinction between core and periphery in the ontological domain of natural language we can turn to the Abstract Objects Hypothesis, given again below:

(3) The Abstract Objects Hypothesis (Moltmann 2013a)

Natural language does not involve reference to abstract objects in its ontological core, but only in its ontological periphery.

This hypothesis is based on a range of more specific generalizations regarding various expressions in the core of English that have been taken to involve reference to abstract objects. The various expressions in question are reanalyzed in one of the following four ways:

[1] The expression involves no reference to an abstract object, but instead to a concrete one, for example a trope (particularized property).

[2] The expression involves no reference to a single abstract object, but plural reference to various actual or possible particulars.

[3] The expression does not involve reference to a truly abstract object, but rather reference to an object that strictly inherits all its properties from actual or possible concrete entities.

[4] The expression does not act as a referential term (in relevant environments), but rather as a nonreferential complement or subject.

Analysis [3] avoids a particular notion of an abstract object, as an object that bears properties directly. When an object strictly inherits all its properties from concrete entities, then the truth conditions of statements about the object generally reduce to those of a statements just about those concrete objects.

In what follows, I will just briefly indicate how various putative abstract terms are reanalyzed, referring the reader to Moltmann (2013a) for empirical and formal semantic details.

First, bare (determinerless) adjective nominalizations such as *wisdom* have standardly been considered singular terms standing for properties (see for example Hale 1983). Philosophers generally make use of such terms and not explicit property-referring terms such as *the property of being wise* when arguing for natural language involving properties as objects, and that is because *wisdom* is regarded a term in the core of language and *the property of being wise* a term in the periphery. The problem for the standard view is that *wisdom* displays different readings with various sorts of predicates than its explicit property-referring counterpart. This is illustrated below:

(4) a. Wisdom exists.

b. The property of wisdom exists.

(5) a. John found wisdom.

b. ??? John found the property of wisdom.

(6) a. Wisdom is admirable.

b. ??? The property of wisdom is admirable.

(7) a. True wisdom is rare.

b.??? The property of being truly wise is rare.

(4a) can state only the existence of an instance of wisdom, not the existence of an abstract object as such, unlike (4b). (5a) means that John found an instance of wisdom, not an abstract property object, unlike (5b) (which could be true only in a metaphysical fantasy). (6a) means that instances of wisdom are admirable, not the abstract property as such, unlike (6b).

Predicates like *rare*, which only care about the distribution of instances, sound natural only with bare adjective nominalizations, as in (7a), not with explicit property-referring terms as in (7b). Generally, predicates are true of what bare adjective nominalizations stand for in virtue

of properties of particular instances; they do not attribute a property to an abstract object, unlike with explicit property-referring terms. In Moltmann (2004), I had adopted analysis [3] positing a type of entity (an Aristotelian ‘kind’) which is unable to bear properties directly but only by inheritance from its instances, namely a kind whose instances are particular tropes. In Moltmann (2013a), bare adjective nominalizations like *wisdom* are no longer considered singular terms, but are taken to stand for kinds conceived as ‘modalized pluralities’, pluralities (as many) of all the actual and possible tropes (particularized properties) (that is, they refer plurally in the sense of Yi 2005, 2006). In both cases, a predicate P when applying to a kind (an Aristotelian kind or modalized plurality) has a derivative meaning, being true of the kind just in case the original property expressed by P is true of some instances (*exist* and *find*) or instances in general (*admirable*). These accounts extend to bare plurals (*giraffes*, *blue pens*) and bare mass nouns (*water*, *white rice*), which again are not considered singular terms standing for kinds as abstract objects.

Entities that strictly inherit all their properties from concrete ones are also posited as semantic values of definite noun phrases of the sort *the water in the container* (with predicates like *decrease*) and *the book John needs to write* (see also Moltmann to appear b). These are variable objects, entities which at different times and in different situations have possibly manifestations, from which they inherit their properties.

In natural language semantics, it has become standard to make use of abstract objects that are degrees, namely for the analysis of positive and comparative adjectives. *Tall* (in *John is tall*) means taller than a contextually given standard degree and *taller* expresses a relation between two pairs consisting of an individual and a degree. Apparent involvement of degrees in the semantics of adjectives is reanalyzed in terms of [1] and [2], replacing abstract degrees by tropes or kinds of tropes (Aristotelian kinds or modalized pluralities) (see also Moltmann 2009). On that view, *John is taller than Mary* means ‘John’s height (a quantitative trope) exceeds Mary’s height), and *John is tall* ‘John’s height exceeds the kind of tropes that makes up the contextual standard’.

Numbers as abstract objects have generally been taken to be well-reflected in natural language. Frege in particular appealed to natural language when arguing for numbers being objects. For Frege, terms like *the number of planets* as well as simple number words like *eight* are singular terms standing for objects. Such apparent number-referring terms are reanalyzed adopting analyses [1] and [4] (see also Moltmann 2013d). First, number words like *eight* are no longer considered referential terms when occurring in argument position, but rather expressions that retain the meaning they have as noun modifiers (see also Hofweber 2003).

The meaning of arithmetical statements in natural language then involves what in the philosophy of mathematics is called ‘the Adjectival Strategy’ (Dummett 1973, Hodes 1984). Roughly, *Two and two is four* is analysed as ‘if there were two things and another two thing then there would be four things’. Apparent number-referring terms like *the number of planets* are reanalyzed as terms referring to number tropes (the planets reduced to just how many they are).

Propositions are abstract objects that play a central role in the semantics of attitude reports and other sentence-embedding constructions. Propositions as abstract objects are considered problematic not just because of their abstractness, but because of specific problems of their own, their role as truth bearers and contents of attitudes (the problems of the truth-directedness and of the unity of the proposition). At least since Frege, propositions have been taken to be the semantic values of *that*-clauses (and sentences in general) as well as the contents of attitudes. Propositions have to be abstract, so the Fregean view, since contents of attitudes are sharable among different agents. The apparent compositional semantics of attitude reports appears to require propositions, on the assumption that *that*-clauses act as arguments providing an argument of the relation expressed by the embedding verb. However, there is good evidence that *that*-clauses do not in fact act as referential terms and thus that their meaning does not act as an object. The linguistic evidence includes the failure of *that*-clauses to be substitutable by *the proposition that S* with most attitude verbs. In Moltmann (2013a), I proposed that *that*-clauses instead act as plural terms standing for an ordered plurality of propositional constituents. More recently, I adopted the view that they act semantically as predicates of an object associated with the attitude verb (what I call an ‘attitudinal object’) (Moltmann 2014). Special quantifiers like *something* or *everything* on the traditional view have been taken to act as propositional quantifiers. But again there is strong linguistic evidence that they do not behave that way, but rather act as nominalizing quantifiers ranging over attitudinal objects or kind (pluralities) of them, the sorts of thing nominalizations of attitude verbs stand for. The view extends to other sentence-embedding constructions such as truth predicates and modals (Moltmann 2018b, 2018c). Given this view, propositions no longer play a role in the semantics of natural language. They at best play a role as semantic values of explicit proposition-referring terms, such as *the proposition that S*.

Expression types are also abstract objects that are generally held to be objects of reference in natural language, namely of pure quotations. But like *that*-clauses, pure quotations display features of nonreferentiality, for example by not generally permitting substitution by an explicit expression-referring term (*red means rouge* does not imply *red means the expression*

red, which is unacceptable). Instead of taking pure quotations to be referential terms standing for expression types, their function is now considered that of ‘presenting themselves’, forming a complex predicate with the embedding verb.

There are natural language terms explicitly referring to propositions, properties, numbers degrees, and expression types, of the sort *the number eight*, *the proposition that S*, *the word ‘rouge’*, *the sentence S*. But those terms belong to the ontological periphery of language not its core. When it comes to the core of language, what appeared to be expressions referring to abstract objects are now considered expressions referring to concreta or kinds of particulars or as expressions that do not act as referential terms in the first place (number words, *that*-clauses, quotations), but contribute to the meaning of the sentence in a different way.

The ontology of the core of language, according to the Abstract Objects Hypothesis, thus is an Aristotelian ontology of just concrete entities, or at least objects whose involvement in a statement would guarantee truthconditional equivalence with a statement just about concrete entities.

5. The ontology reflected in abstract terms in the periphery

On the present view, expressions and uses of expressions in the ontological periphery are legitimate parts of language (or its use). The question then arises for the theoretician how to handle their semantics and ontology.

Of course, the semanticist cannot but accept the meanings that expressions are meant to obtain on a non-ordinary use, and so for newly introduced ‘technical’ expressions. But there is a question of how to regard the ontology that goes along with referential noun phrases on such a use. Here it is important to keep in mind that the ontology of natural language in general should be understood as an ontology of appearances. A referential noun phrase that is part of the ontological periphery thus should have a semantic value that is an object, but which may be a merely conceived object (though it may also turn out to be an actual one). What is important is just that it bears the sorts of properties attributed to it within the relevant theoretical view.

There are also referential noun phrases whose semantic values are part of the periphery due to their compositional semantics. In particular, these would be reifying terms of the sort *the number eight*, *the proposition that S*, and *the property of being wise*. While this is not the place to discuss the syntax and semantics of reifying terms in detail, one general condition that should certainly obtain is that their semantics needs to be sufficiently general to allow for

them to have semantic values on any given philosophers' theory of abstract objects. Yet the compositional semantics of reifying terms is also indicative of the role and nature of abstract objects in the core of natural language. The structure of reifying arguably involves a nonreferential expression or use of an expression following the sortal: *eight* in *the number eight* is still an adjective, and as such just mentioned rather than used (as is the name *Goethe* in the close apposition *the poet Goethe*) (Moltmann 2013a). This then suggests a context-dependent semantics of reifying terms along the following lines. In a context of use *c*, the reifying term *the N X* stands the object *o* that is obtained on the basis of statements in which *X* occurs (referentially or nonreferentially), where it depends on the background assumptions in *c* what *S* consists in. If the object *o* is conceived as an object whose nature is exhausted by the attribution of predicates obtained from true statements in which *X* occurs, this would amount to a pleonastic account of abstract objects (Schiffer 2003). For example, given the Adjectival Strategy, *divisible by two* in *eight is divisible by two* roughly means 'any possible plurality of eight things consists in two equal-membered subpluralities'. Then the predicate *is divisible by two* can be attributed to *o* in virtue of the pleonastic equivalence below:

(8) *The number eight* is divisible by two iff eight is divisible by two.

Similarly, explicit property-referring terms would introduce objects whose nature is exhausted by pleonastic equivalences such as the one below (Schiffer 2003):

(9) John has *the property of being happy* iff John is happy.

However, the semantics of reifying terms should not commit itself to a pleonastic account of abstract objects, that is, an account on which there is nothing more to a number or a property than what can be attributed to it in virtue of an equivalence such as (8) or (9). Rather it should be compatible with various other philosophical views of abstract objects and be able to accommodate the use of sortals (in reifying terms) based on philosophical definition. Thus, (8) is compatible with a view on which *the number eight* is a set-theoretical construct or else a type of collection or just a light object whose properties are to be read of equivalences as in (8). Similarly, (9) is compatible with a view on which properties are platonic objects, collections of similar tropes, or else light objects 'mere shadows' of predicates.

What natural language tells us about abstract objects is not that they could not be objects of reference (and of the sort that a particular philosophical theory takes them to be). It only tells

us that they are not part of the ontological core of natural language. They can be part of the ontological periphery, and (at least as merely conceived objects) fall under various philosophical views, something that semantic theory needs to be able to accommodate.

6. Conclusion

The core-periphery distinction is crucial for natural language ontology, and it is particularly important when approaching abstract objects from the point of view of natural language. It is the basis for the Abstract Objects Hypothesis, a putative universal of natural language ontology.

The ontological core-periphery distinction is due to the legitimate expandability of language, the same feature of language that is grounds for a distinction between core and periphery for lexical/conceptual meaning and that permits ‘conceptual engineering’. In both cases, expansion goes along with additional cognitive effort of reflection. In the case of the ontological periphery, such an act of reflection consists in particular in the recognition of an object as belonging to a particular ontological category, in the application of a sortal noun. Recognizing both core and periphery allows taking language with its ontology to be a cognitive system that comprises both implicit acceptance and reflection and gives justice both to the ontology implicit in natural language and the reflective ontology of philosophers and non-philosophers.

While Chomsky’s core-periphery distinction in syntax has more to do with anomaly and outside influence and appears not to generally guide the practice of actual syntactic research it was originally motivated also by the interest in universal aspects of language. This interest is shared by the present approach of the ontological core-periphery distinction. Only when focusing on the core of language is the pursuit of universals in the cognitive ontology reflected in language possible, such as the Abstract Objects Hypothesis.

Appendix: Some potential issues for the Abstract Object Hypothesis

In this appendix, I will briefly discuss some issues that appear problematic for the Abstract Objects Hypothesis.

First, there is a notion of an abstract state that, it has been argued, plays a role not just for the semantic values of reifying terms of the sort *the state of being happy*, but also as implicit arguments of stative verbs. Thus, Maienborn (2007) introduced a distinction between

abstract states ('Kimian states' as she calls them) and concrete states ('Davidsonian states' as she calls them). Both sorts of states, she argues, act as arguments of stative verbs. Abstract states are implicit arguments of abstract state verbs such as *owe*, *own*, *know*, *be*, *have*, and *resemble* (see also Moltmann 2011). Unlike concrete state verbs like *sleep* and *sit*, abstract state verbs do not accept a range of adverbial modifiers, such as causal and locational adverbials, and that is, so Maienborn, because of the ontology of abstract states, which lack causal roles and a spatial location. Abstract state verbs certainly are part of the core of language, which is in conflict with the Abstract Objects Hypothesis. Maienborn's view, though, is not uncontroversial. There are alternative accounts of the 'stative adverb gap', as it is called. One of them takes stative verbs to lack an event argument position to be filled in by states (Katz 2003). Another account takes adverbial modifiers apply to truth makers rather than event arguments of verbs, or at least when modifying stative verbs (Moltmann 1997).

Another apparent issue for the Abstract Objects Hypothesis is kinds and the applicability of existence predicates (Moltmann 2018). Existence predicates impose particular conditions on what sorts of objects they can apply to, with or without temporal or spatial modifier. Roughly, the generalization is that existence predicates can apply to an entity *o* relative to a location *l* just in case *o* is completely present throughout *l* (Moltmann 2018). The complete presence condition throughout a location has the consequence that existence predicates with temporal modifiers apply only to enduring objects and not events. With spatial modifiers existence predicates can apply to only few sorts of entities (illnesses, languages, and kinds), and that is because those sorts of objects have abstract part structures permitting them to be present at multiple spatial locations at once. As entities with an abstract part structure, kinds then will have to be abstract objects themselves (rather than, say, pluralities of possible and actual particulars). However, other predicates than existence predicates just do not treat kinds as abstract objects, as we have seen in Section 3. There is a solution to this puzzle, and that is to take the constitutive features of kinds not to be abstract properties, but rather kinds of tropes (particularized properties). Kinds of tropes are present throughout a location just in case they have instances throughout the location.

Another issue with the core-periphery distinction is that philosophers drawing on natural in support of an ontological view sometimes make use of expressions from the ontological periphery of language. For example, Vendler (1967) made use of the reifying term *the fact that S* to argue for a distinction between facts and events. I myself in Moltmann (2004, 2013a) made use of reifying terms like *the property of being wise* to argue for a distinction between properties and kinds of tropes (the semantic values of terms like *wisdom*). Here the

use of reifying terms is legitimate as it serves to show an ontological difference between a type of entity from the core and a type of entity already in the periphery. The term from the periphery is associated with intuitions ordinary speakers have -- the periphery is not reserved for philosophers only. Of course, using technical terms that a particular philosopher may have introduced in the context of a philosophical theory would be a different matter.

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