

A. Poliakov (ed.): *Linguistic and Philosophical Thought about Reference*. Brill.

## Is there Reference to Abstract Objects?

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August 25, 2022

The nature and status of abstract objects of the sort of properties, numbers, and propositions, have been at the center of metaphysical debate for a very long time and they form a topic that bears a particular connection to natural language. Philosophers frequently draw on natural language to motivate properties, numbers, and propositions as objects, and it is generally taken for granted that abstract objects of this sort are well-reflected in natural language and in fact that reference to them in natural language is pervasive (Zalta 1983, Hale 1987, Wetzel 2009).

In this paper, I will review and modify in a certain way the view I had advanced in *Abstract Objects and the Semantics of Natural Language* (Moltmann 2013a). This is the view according to which reference to abstract objects in natural language is much more restricted in natural language than traditionally held. More precisely, the thesis of the book, the Abstract-Objects Hypothesis, is that natural language permits reference to abstract objects only in its periphery, not in its core, that is, roughly, only with terms that involve some form of metaphysical reflection. To give an example, *wisdom* is a term of the core of English and it does not actually refer to an object that is a property, but rather it stands for a plurality of particulars (tropes or modes, that is, particularized properties). By contrast, *the property of being wise* is a term of the periphery of English, and it does refer to a property as an object. The core-periphery distinction has implicitly been made throughout the history of philosophy and is essential to uncovering what sort of ontology is reflected in ordinary judgments or intuitions that are manifest in natural language.

Even though reference to abstract objects of the sort of properties, propositions, and numbers is available only in the periphery of language, natural language permits reference to other sorts of abstract objects in its core, in particular abstract artifacts of various sorts. Thus

the Abstract Objects-Hypothesis has to be modified accordingly. I will also elaborate the ways in which reference to abstract objects can be achieved in the periphery of language, through the compositional semantics of reifying terms of the sort *the number eight*.

### 1. The Abstract-Objects Hypothesis

It has been a common view in both philosophy and linguistic semantics that natural Language permits reference to a great range of abstract objects: properties, numbers, propositions, degrees, expression types, facts, states, abstract artifacts. This pervasiveness of apparent reference to abstract objects has led many philosophers to reject natural language as guide to ontology. The ontology of natural language appears to be too permissive to be acceptable to the sort of restricted ontology that many philosophers with a nominalist inclination favor. The apparent pervasiveness of reference to abstract objects and the consequences that some philosophers draw in face of it requires addressing two general issues:

[1] What are the linguistic facts that support or do not support reference to abstract objects?

[2] What sort of methodological basis is there for rejecting or accepting an ontology in view of linguistic facts?

There are two general choices philosophers can make when pursuing metaphysics. First, they may pursue what Strawson (1959) called ‘descriptive metaphysics’, or more specifically natural language ontology (or natural language metaphysics), the project of uncovering the ontology reflected in our ordinary judgments and more specifically natural language.<sup>1</sup> Strawson contrasts descriptive metaphysics in (roughly) that sense with revisionary metaphysics, which, one may say, consists in the pursuit of metaphysics for particular purposes, independently of our ordinary judgments and in particular our intuitions reflected in language. Revisionary metaphysics may consist in addressing the question of what there really is, which is the pursuit of foundationalist metaphysics in Fine’s (2017) sense.

My own approach to metaphysics is that of descriptive metaphysics that gives priority to intuitions reflected in natural language, that is, natural language ontology. Adopting that approach, the overall hypothesis pursued in *Abstract Objects and the Semantics of Natural Language* has been what I call the *Abstract-Objects Hypothesis*:

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<sup>1</sup> See Moltmann (2022) for more descriptive metaphysics and natural language ontology and the particular ways of understanding them.

(1) The Abstract-Objects Hypothesis

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

That is, reference to abstract objects is significantly more restricted than usually thought. The core-periphery distinction is a distinction in expressions or uses of expressions and involves distinct notions of ontological acceptance associated with them. Roughly, the distinction is to be understood as follows. The core of natural language reflects an ontology we implicitly accept when we use natural language; the periphery, by contrast, reflects an ontology we accept derivatively, on the basis of reflection.

The periphery of natural language includes expressions that permit non-ordinary, philosophical uses. This includes nouns such as *property*, *proposition*, and *number*, and perhaps sortal nouns in general. There are also particular constructions that belong to the periphery, in particular the construction of what I call ‘*reifying terms*’ such as *the property of being wise*, *the number eight*, and *the proposition that it is raining* which involve sortal nouns as head nouns).

Why should particular expressions or uses of expressions be classified as belonging to the periphery? Expressions belong to the periphery first of all as a matter of observation of philosophical practices. Philosophers throughout history often draw on natural language in order to clarify philosophical intuitions, such as intuitions about the existence and nature of abstract objects. However, it can be observed that they generally never do so by appealing to expressions in the periphery. Thus Hale (1987) does not appeal to the existence of expressions like *the property of wisdom* when arguing for properties as abstract objects; he only uses examples with the simple term *wisdom*, from the core of language. Frege motivated propositions or thoughts as objects on the basis of the putative semantic status of *that*-clauses, not by appealing to the availability of terms like *the proposition that it is raining*. Frege motivated numbers as objects by appealing to natural language, but not expressions like *the number eight*, but rather sentences like *number of planets is eight*, which involve only terms from the core of language. Linguists when pursuing natural language ontology likewise avoid the periphery of language, but focus on the core only. The core-periphery distinction is thus

motivated by the way philosophers and linguists draw on language.<sup>2</sup> Content-wise, the distinction corresponds to the intuitive difference between implicit and reflective acceptance.

## 2. Apparent abstract terms in English

Let us then turn to the various apparent abstract terms referring to properties, numbers, and propositions. I will review some of the main arguments that the terms in the core of language are better not analysed as terms referring to abstract objects, in contrast to those in the periphery.

### 2.1. Apparent property-denoting terms

In English (and presumably similarly in other natural languages), there are two types of terms apparently making reference to properties. The first is actually best viewed as a term making reference to what one may call, with Aristotle, *a quality*; the second involves reference to a property as an abstract object, that is, what one may call *a property object*.

[1] NPs referring to qualities (*quality terms*)

In English these are bare (that is, determinerless) adjective nominalizations or underived nouns standing for qualities. Examples are *wisdom*, *happiness*, *redness*, and *beauty* (which is not derived from an adjective), as well as NPs with the sortals *quality* and *virtue* (*the quality of gentleness*, *the virtue of humility*).

[2] NPs standing for property objects (property terms)

These are explicit property-referring terms with the noun *property* as head noun, such as *the property of wisdom*, and *the property of being wise*. The choice of head noun is important: *quality* and *virtue* do not lead to property-referring terms. Rather, terms like *the quality of empathy* and *the virtue of humility* pattern with quality terms rather than property terms. Thus, it is not the construction as such that makes a term refer to a quality or a property.

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<sup>2</sup> The construction *the fact that S*, may look like an exception, as pointed out to me by a referee. Facts are an interesting in fact when it comes to the core-periphery distinction.

Strawson (1950) explicitly motivates facts from the construction *the fact that S*, arguing that facts are non-worldly, pseudo-entities. Austin (1961), by contrast, focuses on locutions like *fit the facts* and *is a fact*, arguing that facts are in the world. This might suggest that facts as non-worldly entities are part of the ontological periphery, whereas facts as worldly entities are part of the ontological core.

Vendler (1967) discusses facts as denotata of ‘perfect nominals’, that is, gerunds like *John’s watching a movie*, as well as factive *that*-clauses (see also Peterson 1997), thus not primarily as denotata of the fact that S.

Kiparsky /Kiparsky (1971) and other linguists following them make use of the construction *the fact that S* for the analysis of factive *that*-clauses (positing a silent noun *fact* preceding the *that*-clause).

Quality terms and property terms differ with respect to the readings or applicability of predicates. There are five types of predicates to be distinguished that exhibit different readings with the two sorts of terms:

[1] Existence predicates

Existence predicates exhibit a reading which claims the existence of instances with quality terms, but the existence of an abstract object, a possibly un-instantiated property, with property terms:

- (2) a. Wisdom exists.  
 b. The property of wisdom exists.  
 c. The quality of gentleness exists.

[2] Episodic or what linguists following Carlson (1977) call ‘stage-level’ predicates  
 Such predicates exhibit a reading with quality terms that involves existential quantification over instances and application of the predicate to an instance, but application of the predicate to the property as whole with property terms (generally resulting in a reading that could be true only in a metaphysical fantasy):

- (3) a. John encountered wisdom.  
 b. ?? John encountered the property of wisdom.  
 c. John encountered the quality of humility.

[3] Intensional transitives

Intensional transitive verbs *such as look for* involve existential quantification over instances in satisfaction situations with quality terms, as in (4a, 4c), but application to a property as a whole with property terms, as in (4b):

- (4) a. Mary needs wisdom.  
 b. ?? Mary needs to property of being wise.  
 c. Mary needs the quality of humility.

[4] ‘Characterizing’ or what linguists following Carlson (1977) call ‘individual-level predicates’

Such predicates involve generic quantification over instances with quality terms, but application of the predicate to the property as an abstract object with property terms:

- (5) a. Wisdom is admirable.  
 b. ??? The property of wisdom is admirable.  
 c. The quality of wisdom is admirable.

[5] Frequency predicates

Frequency predicates are applicable to quality terms describing the distribution of instances of the quality, but hardly to property terms:

- (6) a. True wisdom is rare.  
 b.??? The property of being truly wise is rare.  
 c. The virtue of humility is rare.

For any quality noun N, N is, more or less, interchangeable with *instances of N*, preserving the same readings with the five predicates:

- (7) a. Instances of wisdom do not exist.  
 b. John found instances of wisdom.  
 c. John needs instances of gentleness.  
 d. Instances of wisdom are admirable.  
 e. Instances of gentleness are rare.

What are instances of qualities? Both (2a,3a, 4a, 5a, 6a) and (7a-e) make clear that the readings of predicates applicable to quality terms involve instances that are not the bearers of the quality, but rather tropes, the entities that quality terms stand for when they are modified by an NP standing for an individual bearer. *The generosity of the gesture, John's generosity, the wisdom of Socrates, the redness of the apple* are examples. For that reason one may also take qualities to be kinds of tropes. In fact, quality terms exhibit just the sort of readings with the five predicates that bare plurals and mass nouns exhibit, such as *giraffes* and *gold*, that is, NPs that have been considered kind terms since Carlson (1977):

- (8) a. Black Swans / White sand exist.  
 b. John found shells / white sand.  
 c. John needs shells / white sand.  
 d. Black swans is / White sand are / is beautiful.  
 e. Black swans / White sand are / is rare.

Bare plurals and mass nouns are not terms referring to kinds in the ordinary sense, though, since any modified mass or plural nominal can be used that way (*polluted water, sick swans* etc). But there are corresponding terms that refer to kinds in the ordinary sense, subject to conditions on kind individuation, namely *the metal gold* or *the kind human being*. The impossible sentences below show that kinds in that sense are treated as single abstract objects:

- (9) a. ??? John needs the metal gold.  
 b. ??? John encountered the kind human being

Thus, there is an analogous distinction to that between qualities and properties for kinds. Terms referring to kinds as in (9a, b) are much more restricted than bare plurals and mass nominals: here the sortals *kind* and *metal* ensure that the kind fulfills the relevant criteria of kind-individuation.

Even though it has become common place in semantics to take bare plurals and mass nouns to denote kinds, their denotations hardly behave as kinds in any standard sense: as entities that can bear properties as single things and are subject to general conditions of kind individuation. In fact, the semantic behavior of bare plurals and mass nouns suggests that they do not denote single entities at all, but rather refer to pluralities of particulars, including possible particulars (as needed for intensional transitives (Moltmann 2013, Chap. 2). This of course would carry over to quality terms. The latter do not stand for abstract objects in the sense of single objects that exhibit typical properties of abstracta, such as lack of a spatio-temporal location and causal inertness, properties not shared by the former.

The semantic behavior of quality terms means that qualities as denotata just cannot bear properties as a whole; only property objects can. (Frequency predicates denote complex properties definable in terms of quantification over instances.) Qualities rather obtain their properties from instances, tropes, in the way that corresponds to a particular property or

predicate type. This means that particular truthmakers of sentences with quality terms will involve just instances, not the quality as a single object.

What does this mean for the way qualities as denotations of quality terms should be conceived formally? There are two options of construing qualities so as to avoid them being attributed properties as a whole:

[1] Qualities may be construed as entities that just cannot bear properties themselves (Moltmann 2006). The difficulty for that view, though, is to make the notion of an entity unable to be properties intelligible. After all such an entity is an entity and should be able to bear properties as a whole.

[2] Qualities might be conceived as (modalized) pluralities of tropes, (instances of qualities), that is as pluralities of actual and possible tropes (Moltmann 2013a). (Yi 1999, 2000) The challenge for that view is to explain why pluralities of the modalized sort have predicates apply in the particular ways they do, when ordinary pluralities, the denotations of definite plurals (the students) don't.

The denotations of quality terms, just like the denotations of kind terms of the sort of bare plurals and mass nouns, do appear to stand for items in a language-independent ontology. If they are to be considered entities, that would be at a level of a language-driven ontology if that is even the right term. But more likely, they make a different contribution to the meaning of a sentence, perhaps in the sense of [2]. In this paper, I will not elaborate any of the two options further or propose a third one. The point to be made is just that even if the two options face significant challenges, quality terms clearly cannot be treated semantically or ontologically on a par with property terms.

## 2.2. Apparent number-referring terms

Numbers also come with reifying terms. There is no question that *the number eight* refers to a number as an object, something that bears various sorts of properties and whose existence can be under discussion:

(10) The number eight is an abstract object / exists / can be identified with a set...

There are two other apparent number-referring terms in English: *simple numerals* such as *two*, and what I will call *number aspect terms* like *the number of planets*. Simple numerals are not



generally interchangeable with explicit number-referring terms, which they should be if they were to refer to numbers. In particular they aren't interchangeable in arithmetical sentences:

(11) a. two and two is four.

b. ?? ? The number two and the number two is the number four.

(12) a. John added two to two hundred.

b. ?? John added the number two to two hundred.

This indicates that *two* retains its 'adjectival' meaning on which it stands for a number property or quantifier (Moltmann 2013a, b, Hofweber 2007) and that arithmetical expressions have a meaning on which they apply just to such an adjectival meaning. This would match the Adjectival Strategy, pursued in the context of the philosophy of mathematics by Dummett (1973) and Hodes (1984).

Number aspect terms like *the number of children* do not stand for pure numbers, but rather number tropes, given the range of predicates applicable to them (predicates of perception and evaluation), as well as the impossibility of identity statements like (13c):

(13) a. John noticed the number of children / ??? the number eight.

b. The number of children / ??? Twenty is astonishing.

c. ??? The number fifty is the number of children at this school.

*The number of children* rather refers to a number trope: the numerical aspect of the plurality of the children.

Nonmathematical predicates such as *interests me*, *write about*, *think about*, *is interesting*, *plays an important role in certain contexts* do not apply well to simple number terms, as opposed explicit number-referring terms:

(14) a. The number twelve, which interests me a lot, is an important number in religious and cultural contexts.

b. ?? Twelve, which interests me a lot, is an important number in religious and cultural contexts.

c. ?? Twelve, which is a number that interests me a lot, is an important number in religious and cultural contexts.

- (15) a. the number twelve, which I would like to write my dissertation about, ...  
 b. ?? twelve, which I would like to write my dissertation about, ...  
 c. twelve, which is a number that I would like to write my dissertation about, ...

Simple number terms such as *twelve* are restricted to arithmetical properties and operations, whereas explicit number-referring terms go mainly just with nonmathematical properties.<sup>3</sup> An explanation of the difference between mathematical and nonmathematical properties can again be obtained from the Adjectival Strategy (Dummett 1973, Hodes 1984), and further pursued for natural language semantics by (Hofweber 2007, Moltmann 2013a, b). If simple number terms retain the semantic type of adjectives (or determiners), this requires predicates and functors applying to them to undergo type shift, and it is plausible that only particular expressions, mathematical predicates and functors, are able to do so.

Note, though, that this requires considerable changes in standard compositional semantics. There is in fact little evidence for numerals in argument position to function so differently semantically. Apparent evidence from uses of pronouns in relation to names, which I had discussed in Moltmann (2013a, b) turned out to be in error (see Moltmann 2019). The contrast between mathematical predicates and functors and nonmathematical ones would still permit an ontological view, though, on which simple numerals do stand for entities, but entities that just act as placeholders for number properties or quantifiers (Hodes 1984, Moltmann 2018). The difference between mathematical and non-mathematical predicates would then not require type shift, but selection of placeholder entities as opposed to numbers as abstract objects.

The terms that clearly refer to numbers as abstract objects are explicit number-referring terms. Besides that of course, reference to and quantification over numbers is possible with the sortal *number*, which can be used while having any kind of formal conception of numbers in mind.

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<sup>3</sup> Simple number terms and explicit number-referring terms do share some mathematical predicates, namely one-place ones (see Moltmann 2013b for an explanation).

- (i) a. Four is divisible by two.  
 b. The number four is divisible by the number two.  
 (ii) a. Two and two is four.  
 b. ??? The number two and the number two is the number four.  
 (iii) a. Twelve, which is divisible by two, is not a prime number.  
 b. Twelve, which is smaller than fifteen, is greater than ten.

### 2.3. Apparent proposition-referring terms

Propositions generally are taken to be mind-independent abstract truth bearers that serve as contents (or objects) of mental attitudes and illocutionary acts as well as the meaning of sentences. Propositions have in particular been taken to be the meanings of *that*-clauses. Propositions of course are also the denotations of explicit proposition-referring terms such as the proposition that S. However, philosophers generally do not appeal to explicit proposition-referring terms when motivating propositions, but rather to the apparent function of *that*-clauses as referential terms. The nonreferentiality of *that*-clauses is apparent from contrasting behavior of existence predicates and logical predicates, as below:

- (16) a. \* That Fido is a dog exists.  
       b. The proposition that Fido is a dog exists.
- (17) a. ??? That John likes Mary more than Sue is complex.  
       b. ??? That Fido is a dog and Joe a cat is conjunctive.  
       c. ??? That everyone like Fido is quantificational.
- (18) a. The proposition that John likes Mary more than Sue is complex.  
       b. The proposition that Fido is a dog and Joe a cat is conjunctive.  
       c. The proposition that everyone like Fido is quantificational.

In my own published work, I have explored different approaches to the semantics of *that*-clauses: as plurally referring terms refer to ordered pluralities of propositional constituents and as semantic predicates predicated of content bearers such as claims, beliefs, and desires (attitudinal objects) (Moltmann 2014). However, *that*-clauses may also serve a referential role, enabling reference to facts or contextually given claims (*John recognized (the fact) that S*), *John denied (the claim / suggestion) that he will come* (Moltmann 2021). The important point is the contrast between explicit proposition-referring terms and simple *that*-clauses. Reference to propositions is made possible in the periphery of language, through reifying terms, not in the core of language with simple *that*-clauses.

### 3. Reifying Terms and their semantics

All the apparent abstract terms we have discussed correlate with terms that explicitly refer to the abstract objects in question. But only the latter behave as referential terms, referring to single things that satisfy various criteria of abstractness. First of all, they display standard criteria such as a lack of a spatio-temporal location and of causal interactions:

- (19) a. The property of being kind is somewhere.  
 b. The number two is everywhere.  
 c. the proposition that it is raining is here.
- (20) a. The property of being kind made Mary happy.  
 b. The number two caused little surprise.  
 c. The proposition that S made Mary happy.

But the semantics of those terms makes them abstract in another sense, namely being introduced by some form of abstraction or reification. The latter is not to be understood as a mental operation, but rather as a function mapping an expression, concept or other form of content onto an abstract object. The syntax of reifying terms bears such an operation, as we see shortly.

The best known such strategy is Fregean abstraction. This strategy introduces an object by settling its identity conditions in terms of the sequence of the non-abstract objects. Thus, Frege defines the notion of a number  $n$  on the basis of a concept  $C$  and the notion of co-extensionality as follows:

- (21) The number of  $C$  = the number of  $C'$  iff  $C$  and  $C'$  are co-extensional.

Implicit definitions characteristically leave objects underspecified, for those properties that are not settled as part of the strategy of introduction. In that respect, entities introduced by abstraction share another characteristic feature of abstractness: underspecification.

Frege's proposal for introducing numbers as objects by abstraction from concepts does not apply very well, to reifying terms for numbers. It would apply *to the number of planets*, if *planets* is taken to be a concept-denoting expressions, but that terms does not stand for a number as an abstract object, but rather for number trope, the numerical feature of the plurality of the planets (Moltmann 2013a, b). Let us take a closer look at different instances of the type of reifying NP that can also be used to refer to numbers:

- (22) a. the number two  
 b. the word help  
 c. the concept horse  
 d. the truth value true.

In (22b), what follows the head noun is an expression that is mentioned, rather than used. Reifying terms as in (22b) thus involve direct quotation. Direct quotation also includes the case of (22c), where the expression after the head noun conveys a concept. The possibility of direct quotes standing for concepts as in (22b) means that *two* in (22a) and *true* in (22d) can be regarded as concept-conveying direct quotes as well. That is, *true* in (22c) stands for a truth concept and *two* in (22d) for a number concept.

If reifying terms introduce objects from concepts, then the objects can be taken to be individuated through the application conditions of the concepts, however those may be developed:<sup>4</sup>

- (23) a. the truth value  $F =$  the truth value  $F'$  iff the application conditions of  $F =$   
 the application conditions of  $F'$ .  
 b. the number  $F =$  the number  $F'$  iff the application conditions of  $F$  and  $F'$  are the same.

There cannot be a single condition of the sort in (23a) and (23b) for reifying terms because it depends on the head noun how the direct quote that follows it is to be understood, as concept-conveying or expression-conveying (or even referent-conveying for cases like *the poet Goethe*). There are different views about the status of the number object. Peacocke (2019, Chap 5), for example, takes it to be a real object, whereas Hodes (1984) takes it to be a fictional entity.

Explicit property-referring terms display a different sort of reifying structure. Here the head noun is followed by a gerund, at least in English. Property-denoting terms will thus involve mapping the denotation of a gerund onto a property object. There is no generally accepted semantic analysis of gerunds, and this is not the place to propose such an analysis. What is important is only that gerunds do not act as property-referring terms since they are not

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<sup>4</sup> See Peacocke (2019, chap. 5) for an account of numbers on the basis of the application conditions of number concepts within Peano Arithmetics.

substitutable by explicit property-referring terms (*John has the property of PRO being wise*, \**John has being wise*). Thus, whatever the denotation of gerunds will be, an account of the sort in (23a, b) will apply here as well.

Explicit proposition-referring terms take yet another form. Here the head noun is followed by a *that*-clause, which, as we have seen does not act as a referential term. The semantic operation maps the propositional content of a sentence onto an object. Given their syntactic structure, they will involve an operation of mapping the content of such a modifier onto an object. However, they do not just reify that content, but impose further conditions on the object they introduce. Thus, *fact*, *possibility*, and *proposition* impose different conditions on the object they introduce on the basis of a sentential content. Only the philosopher's use of *propositions* triggers a simple reification, as indicated below, making use of the propositional content [S] of a sentence S:<sup>5</sup>

(24) The proposition that S = the proposition that S iff [S] = [S']

Reifying terms belong to the periphery of language, not its core. They are almost never used by philosophers when appealing to natural language to motivate an ontological category.<sup>6</sup> Content-wise, reifying terms, as was suggested, involve a reifying operation of abstraction, which, from the point of view of semantic processing, certainly corresponds to a mental operation of reflection. The entities referred to then are accepted through reflection rather than by way of implicit acceptance.

#### 4. Other abstract objects

In what sense of abstract are abstract objects restricted to periphery? There are other sorts of abstract objects than properties, numbers and propositions (and proposition-like objects). The question in the present context arises: does natural language permit reference to them in its

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<sup>5</sup> The view of propositions as pleonastic propositions looks a bit different, being based on equivalences of sentences containing *the proposition that S* and sentences not containing it (Schiffer 1996):

- (i) a. [The proposition that S] is true iff S.
- b. John believes [the proposition that S] iff John believes that S.
- c. [The proposition that S] is complex iff S is complex.

<sup>6</sup> See Fn 2 for the exceptional use of *the fact that S* by some philosophers and linguists.

core, and if not, do they require reifying terms for being referred to, that is, terms from the periphery? Whereas properties, propositions, and numbers are what one may call purely abstract objects fulfilling the standard criteria of abstractness, there are entities that do not fulfill just some criteria. Thus, abstract artifacts such as musical works, poems, songs, laws, obligations, hypotheses, etc. are not necessarily existents, but come with a temporally limited lifespan.

Clearly, abstract artifacts do not generally require reifying terms. There are various underived and derived count nouns in the core of English that stand for abstract artifacts. Thus the abstractness of artifacts, thus, is not what makes entities belong to the periphery.

There is one sort of abstract artifact that appears to behave differently, though, namely fictional characters. Fictional characters have been considered abstract artifacts (Thomasson 1999), yet they also come with a limited lifespan. They are created when the piece of fiction is created. But they are abstract in that they do not have a spatial location. Natural language obviously permits reference to fictional characters with reifying terms like *the fictional character Anna Karenina*. Referred to that way, fictional characters can be attributed various ‘extranuclear’ properties, properties not attributed within the fiction, but to a fictional character. Natural language also permits the attribution of nuclear properties, when the simple name is used (*According to the story, Anna Karenina is ...*), and one may distinguish what is being referred in such contexts as *intentional objects* from fictional characters (Moltmann 2015). The difference is most apparent with the use of existence predicates in the following true sentences:

(25) a. Anna Karenina does not exist.

b. The fictional character Anna Karenina does not exist.

Whereas (25a) attributes nonexistence to an intentional object, (27b) attributes existence to the fictional character.

There are other entities that are not fully abstract and that show an alternation between an apparently simple term and reifying terms, in particular colors (*green* vs *the color green*) and expressions (pure quotations as in *John called Mary Marie / the name Marie, the name Marie is a common name*). These have discussed in more detail in Moltmann (2013a).

## 5. Conclusion: notions of abstractness and levels of language

Given the various observations about reference to abstract objects in natural language reported here and in my previous work indicate that natural language deals with particular notions of abstractness in different ways. Purely abstract objects, necessary existents that lack of a spatio-temporal location and causal efficaciousness cannot be semantic values of terms in the core of language. They rather have to be introduced by abstraction through the use of reifying terms. They are thus joined by another feature of abstractness, being obtained through formal abstraction.

Yet there are a range of entities fulfilling criteria of abstractness that natural language permits reference to in its core, in particular various sorts of abstract artifacts. An exception, it was suggested, may be fictional characters, abstract artifacts which generally require the use of overt or silent reifying term of the sort *the fictional character Anna Karenina*, which ensures the applicability of external properties. They contrast with simple names standing for intentional objects, entities that permit only the attribution of nuclear properties.

In any case, we can thus conclude that particular notions of abstractness are mirrored in the structure and architecture of language.

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