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Reference to Properties in Natural Language

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1. Introduction

How exactly does natural language permit reference to properties, and what notions of a property does it permit reference to? These are questions of descriptive metaphysics, more specifically natural language ontology. When such questions are pursued, further, further, metaontological questions arise, namely how notions of a property that are implicit in the ontology of natural language relate to the 'technical' notions of a property that figure in philosophy and formal semantics. We will see that there are significant discrepancies which raise further questions about a core-periphery distinction in the ontology of natural language and about core ontology being part of universal grammar.

There a range of potential property-denoting expressions in natural language (or at least English). First, there are what one may call 'quality terms' like *wisdom*. Second, there are explicit property-referring terms like *the property of being wise*. Third infinitival clauses and gerund as such as *to be wise* and *being wise* have been regarded as property-referring terms by several semanticists. Fouth, it is a common view predicates like *wise* or *is wise* stand for properties (though perhaps not in the sense of referring to them). Finally, the view has been held that 'special quantifiers' such as *something* when they take the place of infinitival clauses, gerunds, or predicative adjectival phrases serve as quantifiers ranging over properties.

In this chapter, I will first briefly go through those apparent property-referring terms and the views that have been held about them. I will then focus on complex property-referring terms and present a range of new generalizations that challenge received views of properties. They also challenges views on which property-referring terms pertain to a technical or 'philosophical' use of language, not driven by conditions of core grammar. It appears that the constraint on such terms cannot be due to philosophical theorizing or be acquired through

experience. Rather it appears a manifestation of an ontological notion that pertains to core grammar.

2. Natural language ontology

Let me start with a few more words about the contexts of this chapter. The questions this chapters is pursuing are questions within a particular branch of metaphysics. This is natural language ontology, which itself is a specific branch of descriptive metaphysics as Strawson (1950) called it or what Fine's (2017) calls 'naïve metaphysics'. Following Fine (but deviating somewhat from Strawson 1950), descriptive metaphysics can be taken to be the metaphysics of what there appears to be, whether real or not. As such descriptive metaphysics differs from foundational metaphysics, which is about what there really or fundamentally is.[1]. Natural language ontology can be understood as descriptive metaphysics that gives priority to linguistically reflected intuitions (over language-independent metaphysical intuitions), by making full use of the methods of contemporary semantic and syntactic theory.[2] The subject matter of natural language semantics is the ontology that we *implicitly accept* when using natural language. As such, natural language ontology is at once part of philosophy and part of linguistics.

3. Apparent property-referring terms

3.1. Quality terms

There are various candidates for property-referring terms in English that have been discussed in the literature. One of them is terms like *wisdom, happiness,* and *redness* that is, bare (determinerless) adjective nominalizations. They figure centrally in the Aristotelian tradition of the metaphysics of qualities and thus may be called 'quality terms'. Quality terms, a we will see shortly, differ sharply in their semantic properties from explicit property-referring terms such as *the property of being wise, the property of being happy*, and *the property of being red*.

[1] Descriptive metaphysics is not only a valuable pursuit of metaphysics in its focus on metaphysical intuitions. As Fine (2017) emphasizes, it is also presupposed by foundational metaphysics in that it means to clarify the notions presupposed by foundational metaphysics.

[2] For an overview of natural language ontology see the Moltmann (2022).

Quality terms also include complex NPs like *the quality of wisdom* and *the virtue of humility*, which, even though they share the same construction as explicit property-referring terms, side with quality terms rather than explicit property-referring terms.

The semantics of quality terms that are bare adjective nominalizations is best understood in terms of correlating NPs that refer to particulars, namely adjective nominalizations with a complement or specifier as in (1a) and (1b):

(1) a. the wisdom of Socrates, Socrates' wisdom
b. the beauty of the landscape

Those NPs are standardly taken to be trope-referring terms, or to use the more appropriate term, mode-referring terms.[3] Their denotations display the characteristic properties of modes (or tropes):

1. Properties of concreteness such as being perceivable, being relata of causal relations (*Joe noticed Mary's happiness, Joe's nervousness caused him to forget the problem*)
2. Bearer-dependence (??? *Socrates' wisdom is Plato's wisdom*, which expresses identity, is unacceptable, as opposed to which expresses similarity)
3. Location in time (but not directly in space, cf. Moltmann, to appear) (*John's happiness lasted two years*, ??? *John's happiness is in Munich (where John is)*)
4. Similarity relations based on instantiating the same property (*Socrates wisdom is the same as Plato's wisdom*, where *is the same as* expresses exact or close similarity)

The modes referred to by such terms behave just as the instances of the qualities that quality terms stand for, given the particular readings quality terms display with different predicates. Quality terms differ from explicit property-referring terms in that they show different readings or different degrees of acceptability with respect to five types of predicates.

, First, they exhibit a reading existentially quantifying over instances (modes), rather than stating the existence of a property with existence predicates:

(2) a. Wisdom exists.
b. The property of wisdom exists.

[3] For the distinction between modes and tropes see Lowe (2005) and Hakkarainen and Keinänen (2022).

Second, they display existential quantification over instances rather than an application to an abstract property object with episodic or, as linguists call them, 'stage-level' predicates (Carlson 1977):

(3) a. John found wisdom.
b. ??? John found the property of wisdom.

Third, with intensional transitive verbs such as *need*, quality terms trigger existential quantification over instances in situations satisfying the need, whereas the abstract property needs to be present in such situations with explicit property-referring terms:

(4) a. Mary needs wisdom.
b. Mary needs to property of being wise.

Fourth, with characterizing predicates, or what linguists call 'individual-level predicates' (Carlson 1977), quality terms display a reading of generic quantification over instances, whereas explicit property-referring terms display a reading evaluating the abstract object as such:

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

Finally, frequency predicates, which count instances over time, are hardly applicable to explicit property-referring terms, but are fine with quality terms:

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

The readings and the applicability of the five types of predicates suggest that qualities cannot bear a property as a whole; only property objects can. Qualities, it seems, obtain their properties from instances, that is, from modes (or tropes), in the way that corresponds to a particular predicate type. The distinction suggests that qualities are Aristotelian, inherent, universals, whereas properties are conceived as platonic, transcendent universals (Moltmann 2004). What does this mean for the formal ontology of qualities and properties as abstract

objects? There are two options of how to conceive of qualities as opposed to properties as abstract objects:

1. Qualities are entities that cannot bear properties themselves (Moltmann 2004)
2. Qualities are (modalized) pluralities (as many) of tropes (modes) (Moltmann 2013a).

On the second, more plausible option, quality terms are plural terms, more precisely modalized plural terms, plurally referring to all the actual and possible instances. Given such an account of quality terms, quality terms will not refer to abstract objects, but stand for plurality of particulars. Only explicit-property-referring terms will. This relates to a more general issue regarding reference to abstract objects in natural language. The common view in philosophy and linguistic semantics is that natural Language permits reference to a great range of abstract objects: properties, propositions, numbers, degrees, expression types, facts, abstract states. This view was challenged in Moltmann (2004, 2013), where I argued that quality terms do not refer to abstract objects, but rather stand for kinds of tropes, which need not even be considered entities, but rather modalized pluralities of tropes (Moltmann 2013). This was part of a more general thesis about reference to abstract objects in natural language, namely that natural language permits reference to abstract objects only in its periphery, but not its core, where the core (in the sense of natural language ontology) is understood as the ontology accepted implicit through the use of language, whereas the ontology of the periphery is accepted on the basis of (naïve or philosophical) reflection.

Typical expressions belonging to the periphery are sortals as well as reifying terms (which are formed with sortals as head nouns). Property-referring terms themselves belong to the class of reifying terms (Moltmann 2013a). Here are other reifying terms in English:

(7) a. the color red
    b. the truth value true
    c. the concept horse
(8) a. the proposition that John is wise
    b. the fact that John is wise
    c. the possibility that John might be wise

The structure of the first type of reifying terms arguably is as follows definite article – sortal noun – direct quote (nonreferential(ly used) linguistic material). This structure naturally goes along with some form of abstraction or reification of an entity on the basis of a non-referential

expression (and its contexts of use). This may take a form of Fregean abstraction (Hale 1987) or a something-from-nothing transformation in the sense of Schiffer (1996).

Likewise it is tempting to pursue such a semantics for type 2 reifying terms, assuming that embedded clauses are not referential terms. (8) would thus involve reification yielding a proposition, a fact, or a possibility on the basis of a sentential content. One way of pursuing such as strategy for the semantics of complex property-referring terms would be to make use of the introduction of an object (by abstraction) on the basis of a concept or a predicate obtained by 'denominalization', imposing the following conditions on the so introduced object:[4]

(9) [1] [*the property of* being A] is instantiated by (is had by) d in case [A] is true of d.
[2] [*the property of* being A] is identical to [*the property of* being A'] iff A and A' have the same meaning or application conditions.

This, however, is not the analysis I will later adopt for (a). That's because () and () fail to account for important restrictions on complex-property-referring terms, and it does not conform to standard constraints on compositionality.

If the general semantics of reifying terms is the introduction of an abstact object on the basis of expressions or meanings, then reifying terms involve a form of reflection even naïve, of a metaphysical sort. This constitutes part of the central thesis of Moltmann (2013), the Abstract-Objects Hypothesis:

(10) <u>The Abstract-Objects Hypothesis (Moltmann 2013)</u>
Natural language does not involve reference to abstract objects in its core, but only in its periphery.

The various putative expressions referring to abstract objects were then reanalyzed - as expressions referring to particulars (in particular tropes or modes), as expressions referring to pluralities of (actual or possible) particulars, and as expressions that fail to have a referential

[4] Alternatively, on a something-from-nothing transformation (Schiffer 1996), a pleonastic entity would be introduced whose nature is exhausted by pleonastic equivalences such as:

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

We will later see that the actual semantic behavior of explicit property-referring terms in fact poses a problem for the Abstract-Objects Hypothesis if it is to classify explicit-property terms as part of the periphery.

4. Predicates and special quantifiers like *something*

It is a common assumption that predicates stand for properties. However, there are different views of how to understand the semantic relation of 'standing for' and how to understand the properties predicates are supposed to stand for ontologically. Some philosophers hold that predicates stand to properties in a different relation than property-referring terms, by expressing, rather than denoting them. Others take there to be an ontological difference between properties that predicates stand for and those that property-referring terms stand for. Thus Frege took predicates to stand for concepts, unsaturated entities, rather than objects, the denotations of all referential terms. Reference to properties as saturated objects is possible only through the use of property-referring terms such as *the concept horse or the property of being wise*. While the Fregean view has a large following (Chierchia/Turner 1988, Jones 2016), there are also philosophers such as Bealer (1982) that take predicates to stand for properties as saturated objects, with a predication relation ensuring the relation of a property to its bearer.

Certain quantifiers such as *something* as well as pronouns like *what* and *that* can take the place of predicative adjectives or nouns and thus appear to range over the properties adjectives and nouns stand for:

(11) a. John is courageous.
b. John is something admirable.
c. Bill is that too.
(12) a. John is a father.
b. Bill is what John is, a father.

Such quantifiers and pronouns in fact appear to act as second-order quantifiers / variables ranging over properties as predicable entities. However, there are arguments that such quantifiers range over first order entities, and that those are best viewed as tropes or kinds of tropes (Moltmann 2003), or abstract states (Moltmann 2004). If quantifiers are taken to be

two-place relational predicates applying to two predicates P and Q, then the observation is that Q must be a first-order, whereas Q is a second order predicate:

(13) a. John is courageous.
b. John is something admirable
c. John is something I like e.

Admirable is a first-order predicate and like takes individuals in its object position. Thus, Q is second-order with respect to its first argument position, but second order with respect to its second argument position. *Something* thus can be regarded as a nominalizing quantifier introducing a domain of entities that a corresponding nominalization would stand for (‘happiness’, ‘fatherhood’).

5. Infinitival clauses and gerunds

Infinitival clauses and gerunds such as *to leave the party* and *leaving the party* have been argued to denote properties rather than propositions (Cierchia1984, Chierchia / Turner 1988) . One reason is that infinitives allow the inferences below:

(14) a. John wants to leave the party.
b. Mary wants the same thing, to leave the party / * for John to leave the party.
(15) a. John regretted leaving the party.
b. Mary regretted what John regretted, leaving the party / John leaving the party.

A second reason is that the analysis of infinitival clauses as property-denoting appears to give a straightforward account of *de se* attitudes (Chierchia 1984) in the spirit of Lewis (1979):

(16) a. John hopes [PRO to be talented]
b. hope(John, λx[talented(x)])

Like infinitival clauses, gerunds likewise can provide the content of a *de se* attitude, thus motivating the same sort of analysis:

(17) John remembers being ill at the time.

If infinitival and gerundive clauses are analysed as property-denoting, the notion of a property is that of abundant property in the sense of Lewis (1986) or that of a concept (as opposed to a quality) in the sense of Bealer (1982). This is first, because adjectives and nouns that figure in infinitives and gerunds generally may fail to stand for a sparse property (and they generally don't) and moreover because the properties denoted may be logically complex and quantificational:

(11) a. being heavy or red
b. being round and square
c. being proud of someone
d. being admired by everyone

Here the logical connectives and quantifiers themselves contribute to the property being denoted.[5]

6. Explicit property-referring terms

We can now take a closer look at the semantics of explicit property-referring terms. In English explicit property-referring terms are formed with gerunds, as in (1b) though they may be formed with infinitival clauses in other languages, for example, in French, as in (10b):

(10) a. the property of being wise.
b. la propriété d'être sage
the property to be wise

Explicit property-referring terms display a notion of a property sharply distinct from the abundant notion of a property, on which every predicate in natural language, or logic,

[5] Quality terms, by contrast, may not be logically complex, as seen in the contrast below:

(i) a. Being heavy or red is a disjunctive property.
b. ??? Heaviness or redness is a disjunctive quality
(ii) a. Being round and square is a contradictory property.
b. ??? Roundness and squareness is a contradictory quality.

The reason is a morphological one, though one may argue that this is also part of the nature of qualities.

expresses a property. This is remarkable also because they are formed with gerundive or infinitival clauses, which are themselves not subject to any restrictions.

The discrepancy has nothing to do with the Lewis' (1986) distinction between sparse and abundant properties or Armstrong's (1978) distinction between natural and non-natural properties. Rather the notion of a property is tied to a particular notion of an abstract state – in contrast to that of a concrete state or an event.

As mentioned in Section 3, it is a common view that all predicates and open sentences stand for properties, representable by lambda terms, as illustrated below, making use of Davidson's (1967) event semantics for verbs:

(12) a. long or green
b. $\lambda x[long(x) \vee green(x)]$

(13) a. meeting a person
b. $\lambda x[\exists e \exists y(meet(e, x, y) \& person(x))]$

It is thus tempting to assume that the clausal modifier of *property* in explicit property-referring terms is to be represented by lambda terms as well, denoting a property that is to be identified with an argument of the noun *property*:[6]

(16) a. die Eigenschaft, weise zu sein.
the property to be wise
b. the d[property(d) & ident(d, $\lambda x[wise(x)]$)

However, such an analysis could not give justice to the constraints on the clausal modifier of *property*. Here are the generalizations.

First, *property* does not permit eventive predicates in its clausal modifier. Thus, the following examples are excluded:

(17) a. ??? the property of walking home
b. ??? the property of writing a book
c. ??? the property of meeting Mary

[6] The relation could not just be identity, as this would lead to wellknown paradoxes. See, for exqmple, Chierchia/Turner (1988) for a different proposal .

This also holds for the copula verbs *become* and *remain*:

(18) a. the property of being sick / cancer free
b. ? the property of remaining sick / cancer free
c. ??? the property of becoming sick / cancer free

Become is clearly eventive, and *remain* arguably as well, as it describes an alternative to a contextually entertained change.

The passive appears better than active eventive verbs:

(19) ??? the property of being hit by Joe

This may have to do with a reading of the passive participle as an adjectival passive with the the modifier being of the form *being*+AP as well.

The clausal modifier of *property* allows for certain stative verbs:

(20) a. the property of owning an apartment
b. the property of owing someone money
c. the property of resembling a film star
d. the property of knowing a foreign language

These describe what Maienborn (2007) calls ‘Kimean states’ or why I prefer to call ‘abstract states’ (Moltmann 2015), in contrast to ‘Davidsonian states’ (as Maienborn calls them) or ‘concrete states’, as I would call them. Concrete state verbs are essentially those describing bodily positions or states, and they are generally excluded as predicates of clausal modifiers of *property*:

(21) a. ??? the property of sleeping / standing / sitting / kneeling
b. ??? the property of standing in the corner
c. ??? the property of sitting in the chair

Concrete state verbs and abstract state verbs are sharply distinguished semantic types. Concrete state verbs, in contrast to abstract state verbs, permit spatial modifiers, manner

modifiers, and comitatives, and they can act as naked infinitival complements of perception verbs:

(22) a. ?? Mary knows French in that room
b. Mary is sleeping in that room.
(23) a. ??? John owes Bill money in Germany.
b. ??? John knows French with effort.
(24) a. John was sitting with Mary.
b. ?? John owes Bill money with Mary.
(25) a. John saw Mary sit on the chair.
b. ?? John saw Mary resemble Sue

What matters may not just be the type of verb, but also the relevant reading of the verb. In particular, verbs on a dispositional reading side with abstract state verbs:

(26) a. the property of speaking French
b. ??? the property of speaking right now
(27) a. the property of eating meat
b. ??? the property of eating that piece of meat

Similarly, *living* + location modifier, in the sense of 'residing' is to be distinguished from living as a concrete state:

(28) a. the property of living in Munich
b. ?? the property of living

Exist also classifies as an abstract state verb, as opposed to the eventive existence verbs *occur*, *happen*, and *take place*:

(29) a. the property to exist
b. ??? the property of occurring / happening / taking place

Full verbs thus need to meet particular semantic conditions in order for being acceptable in clausal modifiers of *property*: they need to describe abstract states.

Full verbs contrast in that respect not only with modifiers of the form *being*+AP, but also modifiers of the form *being*+NP or *having*+NP. The copula verbs *be* and *have* followed by an NP are always acceptable in clausal modifiers of *property*:

(30) a. the property of being a father
b. the property of having a father
(31) a. the property of being a player at the game
b. the property of having wisdom
c. the property of having siblings
d. the property of having solved an important mathematical problem

Of particular interest is the fact that *being*+NP may describe, it seems, the very same ongoing as an eventive VP, yet be acceptable as a clausal modifier of *property*. Here are some minimal pairs:

(32) a. the property of being the cause of a commotion
b. ??? the property of causing a commotion
(33) a. the property of being the initiator of an investigation
b. ??? the property of initiating an investigation
(34) a. the property of being an experience of pain
b. ?? the property of experiencing pain
(35) a. the property of being the object of torture
. b. ? the property of being tortured

Eventive verbs contrast similarly with *being*+AP, even if the latter appears to describe the same ongoing. Minimal pairs in English are given in (36) and (37), (38) and (39) are crosslinguistic examples from French and English:

(36) a. the property of being asleep
b. * the property of sleeping
(37) a. the property of being alive
b. ? the property of living
(38) a. la propriété d'être debout
b. * the property of standing

(39) a. la propriété d'être assis
b. * the property of sitting

It is not plausible that the difference with respect to eventive verbs is due to the content of the relevant adjectives and nouns. Rather, more plausibly, the reason is that the copula verbs have and be classify as abstract state verbs, as Maienborn argued for *be*, and thus that the modifier of *property* generally needs to convey an abstract state.

Here are the indications that *have* and be are abstract state verbs:

(40) a. John has a headache in Germany
b. John is sick in Germany

Thus, what is at stake in the constraint on modifiers of complex property-referring is the distinction between abstract states and concrete states. Let us call the constraint on complex-property-referring terms the abstract-state constraint:

(41) The Abstract-State Constraint
The clausal modifier of *property* must describe abstract states.

Adopting the Davidsonian view of verbs on which verbs have an additional argument for events, abstract states will be implicit arguments of stative verbs like *own* and *owe*, of verbs on a dispositional reading, and of the the copula verbs *have* and *be*. Thus we have:

(42) a. John walked
b. ∃e(walk(e, John))
(43) a. John is happy
b. ∃d(is(d, John [happy]))

Abstract states, like events, are particulars depending on a particular agent. This means that they cannot themselves be properties, which are not dependent on particular individuals, but can be shared. Thus, gerunds and infinitival clauses themselves should stand for kinds of events or abstract states. This is independently plausible given the fact that they accept typical kind predicates like *rare* and *widespread*:

(44) a. Winning the lottery is rare.

b. Getting a cold in winter is widespread.

Thus, gerundive and infinitival clauses can be assumed to be interpreted with the help of a kind-forming operator **k** and existential quantification with respect to the subject position: [7]

(45) [PRO V-ing] = **k** e[∃x(V(e, x))]

How should abstract states be conceived ontologically? If abstract states are Kimean states, this means that they are introduced by an implicit definition of the sort Kim proposed for events:

(42) <u>The Kimean notion of an event</u>

For properties P and P', objects o and o', and times t and t',

a. The event s(P, o, t) = the event s(P', o', t') iff P = P', o = o', and t and t'.

b. The event s(P, o, t) exists at a time t iff o has P at t.

Abstract states, unlike events, should not depend on a particular time. Thus, we would have:

(42) <u>Abstract states as properties</u>

For properties P and P', and objects o and o':

a. The state s(P, o) = the state s(P', o') iff P = P' and o = o'.

b. The state s(P, o) obtains at a time t iff P holds of d at t.

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[7] The empty subject of gerunds and infinival clauses might be taken to be what syntacticians call 'arbitrary PRO', standardly taken to be the subject of infinitival clauses or gerunds in generic sentences such as those below, where the empty subject co-varies with generic *one*:[7]

(i) a. PRO_{arb} To love one's parents is a good thing.
b. PRO_{arb} resembling one's parents is normal.
(ii) a. the property of PRO_{arb} loving one's parents
b. the property of PRO_{arb} resembling one's parents

Arbitrary PRO, however, is generally restricted to human beings, or more appropriately, conscious beings, and thus cannot generally be present in complex property-referring terms, which are unproblematic in application to inanimates (*the table has the property of breaking under a weight more than a kilo*). In fact, an empty subject of clausal modifiers of *property* co-varying with *one(self)* is rather bad in application to inanimate objects:

(iii) the property of being identical with oneself / itself / of being self-identical.

The Kimean account of abstract states may have a plausible application to abstract states of being the cause of a commotion, constituted by the property of being a cause (of a commotion). However, it is far from clear that the account could apply to dispositions, state of ownership, debt etc, In fact, the Kimean account presupposes the notion of a property that should exclude the property denoted by eventive verbs like *walk* and concrete state verbs like *stand*. However, whether or not there is a unified definition of abstract state verbs available in the end, abstract states share characteristic properties, such as lack of a spatial location and a specific manifestation, being the object of perception etc, and it is these characteristic properties that drive the selection of the clausal modifier of *property*.

7. Final remarks: Explicit property-referring terms, learnability and the core-periphery distinction

Given the Abstract Object Hypothesis, complex property-referring terms, like all reifying terms should be part of the periphery of language, the place for reflective or nonordinary uses of language. However, explicit property-referring terms are strictly subject to the Abstract-State Constraint, which cannot be overridden by non-ordinary use. No speaker, philosopher or non-philosopher, could use explicit property-referring terms having a notion of property in mind that violates the Abstract-State Constraint. The constraint, which pertains to the constructional meaning of a complex expression, would still need to be classified as part of the ontological core of language.

The Abstract-State constraint obviously is not influenced by any philosophical views about properties a speaker may have been exposed to or have arrived at. Moreover, the constraint can hardly have been learned through experience: a child is unlikely to have ever been exposed to uses of explicit property-referring terms, let alone having been corrected in how to use them. What is remarkable is that even though exposure to such terms and their use is highly limited, we have robust intuitions about the constraints they are subject to. This constraint, which concerns an ontological category, thus appears to have the same status as universal grammar on the generative view and should best be considered part of it.

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