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RESEARCH ARTICLE

The semantics of existence

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Abstract The notion of existence is a very puzzling one philosophically. Often philosophers have appealed to linguistic properties of sentences stating existence. However, the appeal to linguistic intuitions has generally not been systematic and without serious regard of relevant issues in linguistic semantics. This paper has two aims. On the one hand, it will look at statements of existence from a systematic linguistic point of view, in order to try to clarify what the actual semantics of such statements in fact is. On the other hand, it will explore what sort of ontology such statements reflect. The first aim is one of linguistic semantics; the second aim is one of descriptive metaphysics. Philosophically, existence statements appear to reflect the distinction between endurance and perdurance as well as particular notions of abstract states and of kinds. Linguistically, statements of existence involve a particular way of drawing the distinction between eventive and stative verbs and between individual-level and stage-level predicates as well as a particular approach to the semantics of bare plurals and mass nouns.

Keywords Existence · Existence predicates · Bare plurals · Kind terms · Events · States · Individual-level/stage-level distinction · Adverbial modifiers

1 Introduction

The notion of existence has puzzled philosophers for a very long time, and a great range of views about that notion can be found throughout the history of philosophy. While some philosophers think that notions of existence and ontological commitment can and perhaps should be pursued independently of the linguistic

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form of the relevant sentences, the linguistic form of statements of existence has also often been taken to be revealing as to the ontological issues themselves. However, the appeal to linguistic intuitions has generally not been systematic and without serious regard of relevant issues in linguistic semantics.

This paper has two aims. On the one hand, it will look at statements of existence from a systematic linguistic point of view, in order to try to clarify what the actual semantics of such statements in fact is. On the other hand, it will explore what sort of ontology such statements reflect. The first aim is one of linguistic semantics; the second aim is one of descriptive metaphysics. Philosophically, existence statements appear to reflect the distinction between endurance and perdurance as well as particular notions of abstract states and of kinds. Linguistically, statements of existence involve a particular way of drawing the distinction between eventive and stative verbs and between individual-level and stage-level predicates as well as a particular approach to the semantics of bare plurals and mass nouns.

The verb *exist* is of course a central expression for making statements about existence. Many philosophers have expressed particular views concerning that expression (or particular sorts of occurrences of it). At the same time, *exist* has hardly been a subject of study in linguistic semantics, mainly, it seems, because of its apparent 'technical' and thus marginal status. It appears that from the point of view of natural language semantics, *exist* and related predicates such as *occur* and *real* behave in fact not that exceptionally, but are in full conformity with independently established semantic generalizations.

I will focus on verbs of existence when they occur predicatively, as in (1), (2), and (3):

(1) a. The man we talked about exists.
    b. Vulcan does not exist.

(2) a. The accident occurred.
    b. The accident did not occur.

(3) Pink diamonds exist.

These examples illustrate in what ways existence predicates seem so peculiar as predicates. In (1a), *exist* appears to apply trivially, stating that a given man exists. In (1b), *exist* is said to be false of the subject referent—an object that is said not to exist. The event-related existence predicate *occur* exhibits the very same peculiarity in (2a) and (2b). In (3), *exist* seems to not act as a predicate at all, but to express existential quantification.

While there is a major philosophical tradition according to which existence statements are not semantically subject-predicate statements, more recently a number of philosophers have defended the view that *exist* is in fact a first-order extensional predicate, at least with singular terms as subjects (Salmon 1987, 1998; Miller 1975, 1986; McGinn 2000). I will pursue this view in its full generality by arguing that existence predicates such as *exist* and *occur* have a particular lexical

meaning, which matches the particular nature of the entities they apply to and explains their behavior with adverbial modifiers. I will argue that *exist* acts as a first-order extensional predicate also in (3), where the bare plural *pink diamonds* has in fact the status of a kind-referring term rather than being quantificational.

Sentences with the verb *exist* as in (1) have a very different semantics from certain other sentences that can be used to express existence, in particular *there*-sentences and existentially quantified sentences. *There*-sentences and quantificational sentences may involve a significantly greater domain of entities than what *exist* could be true of. This may suggest that *exist* is on a par with the adjectival predicate *real*, but in fact the two expressions are fundamentally different linguistically and carry different ontological implications, as we will see.

I will first point out a range of differences between *there*-sentences and sentences with existence predicates and propose particular lexical analyses of *exist* and *occur*. I will then give an account of existence statements with bare plurals as involving kind reference. Finally, I will compare the predicate *exist* to the expression *real*.

2 Existence statements and *there*-sentences

In philosophy, there are two opposing views on existence. On one view, existence is a univocal concept and closely tied to existential quantification and counting. If there is one thing and there is another thing, even of a very different kind, then there are two things. On the other view, things of different kinds may 'exist' in different ways or engage in different 'modes of being'. Whereas the former view is clearly the dominant one in contemporary analytic philosophy, various versions of the latter view can be found throughout the history of philosophy.[1] Natural language, it appears, reflects both views, in two different types of sentences. *There*-sentences as well as sentences with simple existential quantifiers (*some, a*) may be used so as to reflect the first notion of existence; existence statements, that is, subject-predicate sentences with *exist* or *occur*, reflect the second notion.

2.1 Syntactic differences

There-sentences and existence statements differ in several linguistic respects: with respect to their syntactic structure, with respect to the 'ontological commitment' they carry, and with respect to any constraints on the kinds of entities they may be about.

[1] See van Inwagen (1998) for a philosophical discussion of the two views and a defense of the former, and McDaniel (2010a, b) for a recent defense of the latter. The latter view was also that of Aristotle and Ryle.

There-sentences consist of *there*, followed by a verb such as the copula *be* or *exist*, a weak NP, and possibly a 'coda', a predicative expression of some sort. In (4a), the coda is empty, giving the statement an existential interpretation.[2] In (4b), the coda is a location modifier, giving the statement a locational interpretation[3]:

(4) a. There are [black swans].
b. There is [a man] [in the garden].

Existence statements as in (1)–(3) have a very different syntactic structure: they are subject-predicate sentences with a verb of existence as predicate (such as *exist* or *occur*) and any kind of NP (not just a weak NP) as subject.

2.2 Restrictions to types of entities

One major semantic difference between *there*-sentences and existential quantification on the one hand and existence statements on the other hand concerns the involvement of different types of entities. *There*-sentences allow for quantification over any kind of entity, as do sentences expressing existential quantification with *some* or *a*:

(5) a. There were many objects / events / facts / situations / …
b. some object / event / fact / situation

By contrast, existence predicates are generally restricted to particular kinds of entities. *Exist* generally can apply only to entities that are not events[4,5]:

[2] It is not obvious that *there*-sentences simply express existential quantification. In fact, it is not obvious what exactly the syntactic structure of *there*-sentences is that is to be interpreted and what the status of *there* is. See Kayne (2008) for a recent challenging discussion.

[3] *There*-sentences may also contain an implicit location restriction. Thus, (1b) can be understood as in (1a) in a particular context:

(1) a. There are exactly three scientists in this laboratory that can solve the problem.
b. There are exactly three scientists that can solve the problem.

This is not possible with *exist*-sentences, as we will see.

[4] The predicate *exist* actually applies only marginally to biological organisms (*the horse still exists, the man still exists*). Biological organisms go along better with the predicates *live* or *be alive*. But the latter are not existence predicates, as we will see.

[5] *Exist* can also apply to a temporal stage of an individual:

(1) The Berlin of the 1920ies does not exist anymore.

This means that a temporal stage of an individual still has the ontological status of an object, not that of an event; that is, its parts are not temporal parts.

(6) a. The building exists.
b. The number two exists.
c. ??? The accident exists.
d. ??? John's speech existed this morning.

There are instead specific existence predicates for events in English, namely *occur, happen,* and *take place*, which in turn are inapplicable to material or abstract objects:

(7) a. The accident occurred.
b. John's speech took place this morning.
c. ??? The house never occurred.
d. ??? Vulcan did not take place.

Also entities such as facts, possibilities, states, situations, and laws have their own existence predicate in English. While they may be said to 'exist', they alternatively can be said to 'obtain'.

The selectional restrictions on *exist* and *occur* have been noted in the philosophical literature (Hacker 1982; Cresswell 1986). However, the question has never been pursued what this means for the semantics of *exist* and *occur,* and for the notion of existence as such.

2.3 The notion of an existence predicate

The apparent variety of existence predicates in natural language raises the question of what makes a predicate an existence predicate in the first place. There is a rather clear semantic criterion for existence predicates, namely their semantic behavior under negation, as illustrated by (1b) and (2b). Sentences with ordinary predicates in the present tense as below intuitively lack a truth value if the subject is an empty term or does not stand for an actual, presently existing object:

(8) The king of France is bald.

That is, ordinary predicates in the present tense in general presuppose that the subject stands for an actual presently existing object:

(9) A (intransitive) predicate P is an *ordinary predicate* iff for any world w and time t, for any singular term T, if T does not stand for an actual entity in w, then neither $[\text{T } \textit{not } \text{P}]^{\text{w,t}} = \text{true}$ nor $[\text{T } \textit{not } \text{P}]^{\text{w,t}} = \text{false}$.

By contrast, negated sentences with existence predicates in the present tense are true even if the subject does not stand for an actual object at the present time, as long as the subject describes an object of the sort that would satisfy the selectional requirements of the existence predicate:

(10) Criterion for Existence Predicates
An (intransitive) predicate P is an *existence predicate* iff for any world w and time t, for any singular term T, if T satisfies the selectional requirements of P and does not stand for a (present, actual, nonintentional) entity in w, then $[\text{T } \textit{not} \text{ P}]^{w,t} = \text{true}$.

(10) is formulated so as to be as neutral as possible regarding the treatment of negative existentials, in particular whether they involve empty terms or else intentional 'nonexisting' objects.[6]

There is a range of predicates that classify neither as existence predicates nor as ordinary predicates. For example, predicates such as *is important* and *is influential* can in the present tense be true as well as false of past objects. Sortal predicates generally are ordinary predicates, but not those that individuate entities in part on the basis of a lasting legacy, such as *is a philosopher*. Thus, whereas (11a) does not sound right, (11b) certainly is true:

(11) a. ?? Socrates is a man.
b. Socrates is a philosopher.

But clearly predicates such as *is influential* or *is a philosopher* do not classify as existence predicates. According to (10), this is because they are not predicates that in all circumstances would be false of past objects, and they would not yield a false sentence with a term that fails to have an actual, presently existing referent.

There are also predicates that can be true or false with terms that stand for 'nonexistent' intentional objects, for example comparatives such as *is more intelligent than*. But again these are not predicates that under any circumstances when negated yield true sentences with any non-actual object.

(10) obviously classifies *exist* and *occur* as an existence predicate. But it does not classify, for example, *live* and *is alive* as existence predicates:

(12) The person Mary mentioned does not live/is not alive.

Live and *is alive* presuppose that the object they apply has been alive before the time of utterance. (12) cannot mean that the person Mary mentioned does not actually exist.

2.4 Difference in ontological commitment

Another semantic difference between *there*-sentences and existential quantification on the one hand and existence statements on the other hand is one of 'ontological

[6] For the former approach see, for example, Sainsbury (2005), for the latter Parsons (1980) and Priest (2005), (who make use of 'Meinongian' nonexistent objects), as well as McGinn (2000) (who makes use of intentional 'nonexistent' objects, objects constituted by failed acts of reference).

commitment'.[7] More precisely, *there*-sentences can quantify over past, merely possible, and merely intentional objects, objects that the predicate *exist* (or other existence predicates) could not be true of. This is particularly clear with NPs containing intensional or intentional adjectival or relative clause modifiers, as in the following, possibly true sentences:

(13) a. There are historical buildings that no longer exist.
b. There are possible buildings that do not actually exist.
c. There are imaginary buildings that do not exist.

(14) a. There are buildings built in the past that no longer exist.
b. There are buildings I might have built that do not exist.
c. There are buildings John thought of that do not exist.

In these sentences, it is in fact not the *there*-construction by itself that enables quantification over 'nonexistent' objects; rather the intensional or intentional modifiers have a crucial function as well. In (13a–c), existential quantification over past, possible and what appears to be intentional objects is made possible by the intensional adjectives *historical, possible*, and *imaginary*; in (14), it is made possible by the intensional or intentional verbs inside the relative clause.[8,9] Without such modifiers, it is hard to consider such sentences to be possibly true[10]:

(15) ?? There are buildings that do not exist.

As mentioned in the previous section, ordinary sortal predicates like *building* are existence-entailing, just like the predicate *exist* itself. *Exist* in the present tense cannot be true of past and merely possible objects, and it cannot be true of what appear to be intentional objects, either.

Ordinary existential quantification shares with *there*-sentences the ability to quantify over 'nonexistent' entities. Thus, *some* can be used to quantify over past, possible, and intentional objects while the sentence at the same time states that they do not exist:

[7] Priest (2005) takes *there*-sentences and *exist*-sentences to pattern the same semantically and to be distinct from quantification (which for him allows for a greater domain of quantification), erroneously, I think.

[8] Intentional, 'nonexistent' objects are highly controversial and require an in-depth discussion that goes beyond the scope of this paper. A particularly plausible account of them, in view of sentences like (13c) and (14c), is that they are objects that are constituted by failed referential acts (McGinn 2000). But for a critical discussion of McGinn's (2000) view see van Inwagen (2008).

[9] Given that sortal nouns are existence-entailing, this will require a relative-clause-internal interpretation of the head of the relative clause *buildings*, ensuring that the sortal noun is interpreted inside the scope of the intensional or intentional verb, as in the logical form for (14b) below:

(1) There are O [might [I have built e buildings)

[10] Of course, (15) could be made acceptable with an implicitly understood modifier *possible* or *imaginary*.

(16) a. Some historical buildings no longer exist.
b. Some possible buildings do not actually exist.
c. Some imaginary buildings do not exist.

The conclusion to be drawn is that the 'ontological commitment' that may be expressed by *there*-sentences or existentially quantified sentences has to do with the use of an existence-entailing predicate, not the *there*-construction or quantification as such.

3 The meanings of *exist* and of *occur*

Sortal restrictions generally are not accidental, but rather constitute preconditions for the property expressed by a predicate to be applicable to an object. For example, it is because of its particular lexical meaning that the verb *stop* imposes a restriction to events, namely to events that have been going on before the time of evaluation. If this is right, then the fact that different existence predicates apply to different kinds of entities means that such predicates have a particular lexical content applicable only to the particular sorts of objects they accept. The difference between *exist* and *occur* in particular indicates that *exist* and *occur* do not just locate entities in the actual world at a particular time; rather they do it in a way that has to do with a fundamental difference between objects and events.

There is an important philosophical tradition that attributes two fundamentally different ways of persisting through time to objects and events, endurance and perdurance (Lewis 1986, p. 202). Endurance and perdurance are standardly associated with two different ways in which objects and events have parts. Whereas events as perduring entities can have temporal parts, objects as enduring objects can have only spatial parts. An enduring object is an entity that is wholly present at each instance of its lifespan, but not so for a perduring object, an event. At a given moment that is a proper part of an event's duration, only a temporal part of the event is present, not the whole of the event.

There is a significant debate in contemporary metaphysics as to whether such a distinction between objects and events should be made or whether both objects and events should be considered four-dimensional space–time regions (or series of stages) with both objects and events having temporal parts at all the moments of their duration.[11] While this paper is not a contribution to the metaphysical debate as such, it appears obvious from the different semantic behavior of *exist* and *occur* that natural language adopts a form of endurantism for material objects as opposed to events. *Exist* allows for a conjunction of temporal modifiers, locating the entire object at different times. *Occur* does not allow for a conjunction of temporal modifiers; a temporal modifier can locate only the occurrence of the event during its entire duration:

[11] For a defense of four-dimensionalism see, for example, Lewis (1986), Heller (1990), Hawley (2001), and Sider (2001). For a defense of endurantism or three-dimensionalism see, for example, Merricks (1995), Wiggins (1980), and Fine (2006).

(17) a. The house existed last week, yesterday, and this morning.
b. ??? The protest occurred yesterday morning, yesterday evening, and this morning.

The standard way of stating endurance is in terms of a notion of 'complete presence': an entity endures at a time t in case it is completely present at each moment of t (Lewis 1986). The notion of endurance so stated has been the subject of a major debate in contemporary metaphysics.[12] One central problem that endurance theory raises is the fact that an object may have a part only temporarily. Requiring that all the parts of an object be present at any moment of the object's lifespan is too strong a condition, but requiring that only the parts be present that the object has at the moment in question makes the account trivial (Sider 2001). It is not obvious, though, that the standard endurance condition is hopeless. Rather it may be repairable by distinguishing different sorts of parts for different sorts of entities. Some entities, such as sums or quantities, have their parts essentially and to them the standard endurance condition certainly applies. Other objects have functional parts that may involve different material realizations at different times (and thus allow for a replacement of parts), and those functional parts may be more or less constitutive of the identity of the object. For example, a table top is essential to a table, though it may at least in part be replaced by new material. Complete presence may thus be understood so as to allow that relevant functional parts be realized. Moreover, complete presence should involve a vague condition of 'sufficiently many' parts being realized or present. Thus 'x is completely present at a time t' should better be understood roughly as 'the parts of x are sufficiently present or realized at t'.

The standard characterization of endurance also has difficulties with momentaneous events, which *would* meet the complete presence condition. One way to preclude momentaneous events is by appealing to the ability of an entity to have temporal parts in virtue of the ontological category to which it belongs: events can have temporal parts, but material objects cannot.[13] Given this, the conditions on the application of *exist* and occur may in first approximation be stated as follows:

(18) a. For an entity x that cannot have temporal parts in virtue of the category to which it belongs, $x \in [exist]^{t,w}$ iff for any t', $t' \subseteq t$, x is completely present at t' in w.
b. For an entity x that can have temporal parts in virtue of the category to which it belongs, $x \in [occur]^{t,w}$ iff for any proper part t', $t' \subseteq t$, $t' \neq t$, only some proper part of x is present at t' in w.

This account of the content of *exist* and *occur* does not yet capture one crucial difference between the two verbs, namely that *exist* is a stative verb and *occu*r an

[12] See Hawley (2001) and Sider (2001) for discussion.

[13] An alternative is to require that enduring objects exist at at least two moments (Hawley 2001).

eventive verb. This difference is particularly apparent from the possibility of applying the progressive to *occur* (and *take place*), but not to *exist*:

(19) a. ??? The building is currently existing.
b. The protest is finally occurring/taking place.

It is also reflected in the corresponding nominalizations. *The existence of the building* clearly describes a state, whereas *the occurrence of the protest* describes an event. The latter can have typical event properties, such as 'being sudden', which the former cannot.

Given the Davidsonian view on which events act as implicit arguments of verbs, the event or state that nominalizations stand for is quite simply the implicit event or state argument of the verb from which the nominalization was derived. Given that view, e*xist* is a stative verb which describes states that would also be the referents of NPs with the corresponding nominalization, such as *the existence of the president of France*; by contrast, *occur* is an accomplishment or achievement verb that describes events that would also be the referents of NPs with the corresponding nominalization, such as *the occurrence of the murder*.

'The occurrence of the murder' is not the same event as 'the murder'. The latter may have been done with a knife, may have been grisly and brutal; the former cannot be any of that; though it could be sudden, unexpected, or early. An occurrence of an event e in fact is an event that does not have any inherent qualitative properties and in that respect generally differs from e; it is an event that is entirely constituted by transitions from the temporal location of one part of e to the temporal location of another part of e. Thus, *occur* when applied to an event e describes another event that consists in the transitions among the 'presences' of the parts of e at relevant subintervals that belong to the duration of e. *Exist* when applied to an object x, by contrast, describes a state that is the complete presence of x during the time in question. Making use of Davidsonian event arguments, the content of *exist* and *occur* can thus be given below:

(20) a. For a world w, an entity x that cannot have parts in virtue of the category to which it belongs, and an interval t, $<e, x> \in [\textit{exist}]^{w,t}$ iff e consists in the presence of (the whole of) x in w at t′ for any subinterval t′ of t.
b. For a world w, an entity e that can have parts in virtue of the category to which it belongs, and an interval t, $<e, e'> \in [\textit{occur}]^{w,t}$ iff e consists in transitions from the presence of e′ in w at t′ to the presence of e″ in w at t″ for any minimal parts e′ and e″ of e for which there are subsequent subintervals t′ and t″ of t at which e′ and e″ take place.

Thus, the lexical content of *exist* involves mapping an object onto a (non-qualitative) state of the object at a time. The lexical content of *occur* involves mapping an event onto a non-qualitative event that reflects the temporal part structure of the former.

The difference in the kinds of states or events that *exist* and *occur* describe can explain a further difference between the two existence predicates, namely differences in the acceptability of adverbial modifiers.

4 Location modifiers with existence statements

Exist and *occur* behave differently with respect to location modifiers. *Occur* generally allows for location modifiers:

(21) The murder occurred in Munich.

By contrast, location modifiers (modifying the verb or entire sentence) are not generally possible in existence statements with *exist*. With singular terms and strong NPs, such modifiers are completely excluded:

(22) a. ??? The man we talked about exists in another city.
b. ??? Mary does not exist in Germany.

(23) a. ?? Every cat we talked about exists in this city.
b. ?? Most people mentioned in this book exist in Germany.
c. ?? The only man who can solve the problem exists in Germany.

Such sentences do not allow for an implicit location restriction either. Thus, *exist* in the sentences below can be understood only absolutely, not with respect to an implicit restriction of the sort 'in Germany':

(24) a. ??? The man we talked about exists. (meaning 'exists in another city').
b. ??? Mary does not exist. (meaning 'exists in Germany').

(25) a. ??? At least five million people exist. (meaning 'exists in this country').
b. ??? Several universities exist. (meaning 'exist in this city').

With weak NPs as subjects, location modifiers are at least marginally acceptable:

(26) a. ?? At least five million people exist in this country.
b. ?? Several universities exist in this city.
c. ?? Exactly fifty cats exist in this village.

The relative tolerance of location modifiers in (26) can be related to the acceptability of location modifiers in the corresponding *there*-sentences:

(27) a. ? There exist at least five million people in this country.
b. ? There exist three scientists in this city.
c. ? There exist exactly fifty cats in this village.

The sentences in (26) in fact arguably are derived from the same underlying syntactic structure as *there*-sentences, by moving the weak NP in postverbal position into the position that would, without movement, be spelled out as *there*.[14]

The explanation why location modifiers are impossible with *exist*-sentences about material objects needs to take into account two functions of location adverbials that have to be distinguished. Location adverbials may function both as adjuncts and as arguments of the verb. Let us follow a standard way of conceiving of the different semantic roles of arguments and adjuncts. Then in the first function, the location modifier serves to locate the event described by the verb in space, whereas in the second function, the location modifier contributes an argument to the lexical meaning of the verb. The two functions are illustrated below:

(28) a. John plays in the garden.
b. John lives in Munich.

In (28a), *in the garden*, acting as an adjunct, locates John's activity of playing; in (28b), *in Munich* provides an argument of *lives*, which expresses a two-place relation between people and the location of their residence. In *exist*-sentences about material objects, location modifiers are excluded in both functions and thus an explanation is required for each of them.

With location adverbials as arguments, *exist* expresses space-relative existence, a notion introduced and defended by Fine (2006). Given time-relative existence, as roughly endurance through time, there is an exactly analogous notion of space-relative existence, as a notion quite distinct from spatial extension (Fine 2006). Existence in space differs from extension is space, just like existence in time differs from extension in time. Given the traditional notion of endurance, existence of an object at a time amounts to 'complete presence' (in a suitable sense) of the object at any moment of the time.[15] Analogously, the existence of an object in a spatial region will amount to complete presence of the object at each subregion. Obviously, spatially extended material objects could not engage in space-relative existence: their spatially extended parts could not be present at the relevant subregions. This is what explains the impossibility of spatial modifiers with *exist.*

Fine (2006) has argued that there are objects that engage in space-relative existence. Given the present view, these would be objects that are completely present at each subregion of the space in question. Abstract objects such as languages and laws are particularly convincing cases[16]:

[14] Williams (1984) argued that the subject position of *there*-sentences and the postverbal weak NP are linked by coindexing. Such coindexing might permit movement of the postverbal NP into subject position, before '*there*-insertion'.

[15] Fine (2006) does not make use of the standard notion of endurance in terms complete presence. But 'complete presence' suitably modified applies particularly well to capture space-relative existence.

[16] Fine (2006) proposes aromas as entities allowing for space-relative existence. However, space-relative *exist* is in fact not very felicitous with aromas:

(1) ??? The aroma of coffee and vanilla exists in the house.

(29) a. This dialect does not exist in this region anymore.
b. This law still exists in some countries.

If complete presence of a language at a location means knowledge of the language by an individual (even incomplete knowledge of the (complete) language), then it is clear why languages can engage in space-relative existence: a language exists in a region r in case the entire language is the object of knowledge (even partial knowledge) of individuals in relevant subregions of r. There is also a sense to be made of a law being completely present at subregions of a region: all the conditions that are constitutive of the law will be in place at any subregion in which the law has been declared.[17]

5 Restrictions on location modifiers as adjuncts: *exist* as an abstract state verb

The impossibility of *exist* allowing for location modifiers as adjuncts can be explained given recent linguistic work on the semantics of stative verbs. In fact, *exist* shares its resistance of location modifiers with most stative verbs. Stative verbs such as *resemble, belong to*, and *know* also resist location modifiers, as modifiers locating the described state on the basis of the location of the participants:

(30) a. ??? John resembles Joe in Germany.
b. ??? The house belongs to John in Germany.
c. ??? John knows French in Germany.

Stative verbs in general also resist a range of other adverbial modifiers, such as manner modifiers or instrumentals, a generalization that has become known as the Stative Adverb Gap (Katz 2003):

(31) a. ??? John resembles Joe with a lot of effort.
b. ??? The house belongs to John in a peculiar way.

Moreover, stative verbs generally cannot form the infinitival complement of perception verbs:

(32) a. ??? Bill saw John resemble Mary.
b. ??? John heard Mary know French.

Exist shares those characteristics of stative verbs as well, unless it is coerced into a 'concrete way of being' reading (on which *exist* would also take location modifiers)[18]:

[17] Note that laws have their own existence predicate, namely *is valid*.

[18] See Maienborn (2007) for the possibility of coercion of state verbs into an eventive reading.

(33) a. ?? The man we talked about exists quietly/discretely/secretly.
b. ?? The animal exists peacefully in the forest.

(34) ??? John saw the building exist for only a short time.

According to one approach to the Stative Adverb Gap, stative verbs lack an event argument place (Katz 2003). According to another approach, which I will follow, stative verbs have an implicit event argument position but in general take particular sorts of states as arguments which fail to have the sorts of properties expressed by the relevant modifiers (Maienborn 2007). Maienborn calls such states 'Kimian states', following Kim's (1976) conception of events; I will call them 'abstract states'.[19] On a Kimian conception of states, states will be implicitly defined, on the basis of individuals and properties, as below:

(35) a. For a property P and an individual o, the state s(P, o) obtains just in case for some time t, $P^t(o)$.
b. Two states s(P, o), s(P′, o′) are identical in case $P = P'$ and $o = o'$.
c. A state s(P, o) obtains at a time t just in case $P^t(o)$.

According to (35), states are abstract objects, in fact objects obtained by abstraction in a Fregean sense (Moltmann 2012, 2013, Chap. 2). (35) introduces abstract states as entities having just those properties that are specified by the conditions in (35). Abstract states will fail to have a location, will not allow for particular manifestations, and are not possible objects of perception simply because (35) says nothing about such properties.

The incompatibility of location modifiers and other adverbial modifiers with *exist* thus follows from *exist* taking abstract states as implicit arguments. The property from which the abstract state argument of *exist* is obtained will be a time-relative property—or rather a relation between properties and times, which holds of a time t and an object x in case x is completely present at any subinterval of t, as in (36a). Time-relative *exist* will then denote the relation between states and individuals in (36b):

(36) a. $P = \lambda t \lambda x[\forall t' < t\ AT(x, t')]$
b. For a time t, an event e and an individual x, $<e, x> \in [exist]^t$ iff $e = f(P(t), x)$

There is a minority of stative verbs that do allow for the full range of adverbial modifiers and can form the infinitival complement of perception verbs. These include verbs of bodily position and posture, such as *sit, wait, stand,* or *sleep* (Maienborn 2007):

(37) a. John sat in the corner.
b. John sat awkwardly.
c. Mary saw John sit in the corner.

Maienborn (2007) argues that these take 'Davidsonian states' as arguments, or what I will call *concrete states*, states that are on a par with events on a Davidsonian view

[19] For more on the notion of an abstract state see Moltmann (2012, 2013, Chap. 2).

of events, rather than being introduced by abstraction in the way of the Kimian account of states.

Let us then turn to the verb *occur*. At first sight, events that are 'occurrences' may also seem abstract. They are not qualitative and allow fewer adverbial modifiers than the events of which they are occurrences, as we have seen. However, occurrences, like basically all events, still can be located in space:

(38) John's murder occurred in Germany.

Moreover, they can be the object of perception:

(39) John saw the murder occur this morning.

Even if occurrences cannot have a range of qualitative features, they are still concrete, in the sense of having a spatio-temporal location, perceivability, and causal efficaciousness. By being qualitatively 'thin' but still concrete events, occurrences are fundamentally different from abstract states.

A plausible way of conceiving of occurrences in terms of the notion of a concrete state is as transitions among concrete states. Let us assume that concrete states are compositions of some sort of individuals and particular features of those individuals. Then qualitatively thick events will be transitions among concrete states composed of individuals and qualitative features. By contrast, occurrences will be transitions among concrete states composed of parts of the occurring event and temporal features of the sort 'being at time t′. If c is the relevant composition function and *transit* a multigrade function mapping any number of concrete states onto the transition among those concrete states, then time-relative *occur* will express roughly the following two-place relation between events:

(40) For events e and e′ and a time t, $<e, e'> \in [occur]^t$ iff $e = \text{transit}(c(e_1, \lambda x[AT(x, t_1)), c(e_2, \lambda x[AT(x, t_2)), \ldots)$ and $e_1, \ldots, e_n$ are relevant temporal parts, with $t_1, \ldots, t_n$ as their duration.

The explanation of the acceptability of adverbial modifiers as adjuncts in existence statements thus requires a complex ontology of both abstract states and event occurrences.

6 Existence statements with bare plurals and mass nouns

6.1 Bare plurals and mass nouns as kind-referring terms

Let us turn to existence statements with bare plurals as subjects[20]:

[20] Everything that is said in this section about *exist*-sentences with bare plurals holds in the very same way for *exist*-sentences with bare mass nouns as subjects, such as (1) below:

(i) White gold exists.

(41) Giraffes exist.

The general view in the philosophical literature is that such sentences are existentially quantified sentences, which thus have a completely different logical form from *exist*-sentences with singular terms as subjects. That is, *exist* with bare plurals would contribute to the expression of existential quantification rather than acting as a predicate of individuals.

There is a range of evidence that shows that this view is mistaken. It appears that with the verb *exist* bare plurals are not (or at least not generally) quantificational NPs, expressing existential quantification. Rather they are kind terms in the sense of Carlson (1977). That is, *giraffes* in (41) stands for the kind whose instances are particular giraffes, just as it does with kind predicates such as *rare, widespread*, or *extinct* below:

(42) Giraffes are rare/widespread/not extinct.

Kinds as semantic values of bare plurals appear to be universals in an Aristotelian sense; they exist just in case there is an instance of the kind.[21]

But *exist* is not the only predicate exhibiting an existential reading with bare plurals. Thus, Carlson (1977) argued that bare plurals generally trigger existential readings with what he called *stage-level predicates*, predicates expressing properties perceived as temporary:

(43) a. Firemen are available.

They contrast with what Carlson (1977) called *individual-level predicates*, predicates expressing properties perceived as permanent (and thus in particular essential properties).[22] Individual-level predicates generally trigger a generic reading, as in (43b):

(43) b. Apples are healthy.

On the Carlsonian view, stage-level predicates are 'lifted' from predicates applying to individuals to kind predicates on the basis of existential quantification over instances, and individual-level predicates on the basis of generic quantification over instances, as below, where 'Gn' is the generic quantifier, and I the instantiation relation[23]:

(44) a. For a stage-level predicate P, for a kind x, $x \in [P_{kind}]$ iff $\exists y$ (y I x & $y \in [P]$).
b. For an individual-level predicate P, for a kind x, $x \in [P_{kind}]$ iff Gn y [y I x] [$y \in [P]$].

[21] Natural language also allows for reference to 'Platonic universals', universals that exist independently of whether they have instances, for example *the property of being a giraffe*, see the discussion in Moltmann (2004, 2013, Chap. 1).

[22] See also Kratzer (1995) and Krifka et al. (1995) for discussion.

[23] See Krifka et al. (1995) for the notion of a generic quantifier.

Stage-level predicates in addition allow for a generic (habitual) reading of bare plurals. Thus (43a) also has the reading: for any fireman x, x is available. By contrast, individual-level predicates do not allow for an existential reading. We will later see that there are particular difficulties with the account in (44a) when applied to *exist*, and perhaps even more generally.

Carlson's view according to which bare plurals are always kind-referring is not universally accepted. More common in fact is the view that in addition to being kind-referring, bare plurals may also have an interpretation on which they express existential quantification, a view I will turn to further below. Whatever view one may adopt about the uniformity or non-uniformity of the semantics of bare plurals, the various arguments for kind reference do apply to bare plurals in the context of the predicate *exist,* thus establishing bare plurals as kind-referring in that particular context.

First, definite anaphora behave with bare plurals differently from NPs that clearly express existential quantification, such as *three dinosaurs*:

(45) a. Dinosaurs do not exist. But they once did exist.
b. Three dinosaurs do not exist. But they once did exist.

They in (45a) stands for the entire kind, the denotation of *dinosaurs*. By contrast, *they* in (45b) can only stand for particular dinosaurs, not the entire kind.

Furthermore, bare plurals in *exist*-sentences do not take wide scope over negation or other quantifiers:

(46) a. Dinosaurs do not exist anymore.
(impossible as: for some dinosaurs x, x does not exist anymore)
b. Two dinosaurs do not exist anymore. (ok: for two dinosaurs x, x does not exist any more)

If *dinosaurs* in (46a) stands for a kind, then *not* can deny only the holding of the predicate of the entire kind, not just of some instances. By contrast, *two dinosaurs* in (46b) can take scope over *not*.

Further evidence for kind reference of bare plurals as subjects of *exist*-sentences is that they allow for typical kind predicates in relative clauses, such as *widespread*:

(47) Dinosaurs, which used to be widespread in Europe, do not exist anymore.

Also temporal modifiers support kind reference of bare plurals with *exist*. *Still* and *no longer* in (48a, b) are understood so as to qualify the entire lifespan of the kind rather than that of particular instances:

(48) a. Dolphins still exist.
b. Dinosaurs no longer exist.

Aspectual predicates such as *continue* and *cease* make the same point:

(48) c. Dinosaurs continued to exist.
d. Dinosaurs ceased to exist.

Only the entire kind can be said to continue or cease to exist.

Another argument for kind reference of bare plurals in *exist*-sentences comes from the observation that *exist* is acceptable with bare plurals describing events:

(49) a. Great wars still exist.
b. ??? The Second World War existed in the 20th century.

Exist displays an existential reading with kinds of events, but *exist* itself is inapplicable to particular events as in (49b).

A similar argument comes from the possibility of location modifiers in *exist*-sentences with bare plurals:

(50) a. Giraffes exist in Africa.
b. Political protests do not exist in Bhutan.

Recall that location modifiers are impossible in *exist*-sentences with singular terms. The possibility of location modifiers with kind-referring bare plurals will later be traced to the ability of kinds to engage in space-relative existence (Sect. 6.3).

A further piece of support for kind reference of bare plurals in *exist*-sentences is that *exist* exhibits the very same reading of existential quantification over instances with other sorts of kind terms, for example *this flower* or *this animal*[24]:

(51) a. This flower does not exist anymore.
b. This animal does not exist in this region anymore.

It is also noteworthy that singular indefinite NPs as below are significantly less natural as subjects of *exist*-sentences than bare plurals:

(52) ? A/Some giraffe exists.

Intuitively, (52) is about a single giraffe, not about giraffes as such. In (52), *a* or *some* and *exist* do not merge into a single 'existential quantifier', but rather *exist* is predicated of entities that *a giraffe* or *some giraffe* quantifies over. If bare plurals in *exist*-sentences are kind-referring, then the logical form of (51a) would thus be as in (53a), whereas the logical form of (50a) would be as in (53b), for the kind giraffes k:

(53) a. $\exists$x(giraffe(x) & exist (x))
b. exist in Africa(k)

[24] Demonstrative kind terms such as *this flower* are type demonstratives, referring to a kind by pointing at an instance.

While the linguistic criteria make clear that in general bare plurals in *exist*-sentences are kind terms, the view that bare plurals in existence statements are kind-referring has almost never been pursued in the philosophical literature, which generally takes those NPs to be quantificational (somehow merging their semantic contribution with that of *exist*).[25]

The generalization that bare plurals in *exist*-sentences are kind-referring requires a qualification. It appears that bare plurals may also sometimes act as existential quantifiers in *exist*-sentences. First of all, there is somewhat indirect evidence, coming from languages such as French which do not have bare plurals. In French, definite plurals are used as kind terms (*les giraffes* 'the giraffes'), and NPs with *de* are used for existential quantification. (*Jean a acheté des livres* 'John has bought books'). In *exist*-sentences, often both options are available:

(54) a. Les nombres naturels existent.
b. Des nombres naturels existent.
'Natural numbers exist.'

However, when the nominal does not describe a 'natural class' or kind (that is, a maximal collection of resembling particulars), the second option is better:

(55) Des nombres primes entre 10 et 15 / ?? Les nombres primes entre 10 et 15 existent.
'Prime numbers between 10 and 15 exist.'

In that case, English would also use the bare plural, as indicated in the translation of (55).

Thus, it appears that bare plurals with *exist* act as existentially quantified NPs if their descriptive content would make kind reference implausible.[26]

6.2 The readings of *exist* with kind terms

Let us take a closer look at the readings that *exist*-sentences exhibit with kind terms. In general, it appears that *exist* holds of a kind (as denoted by a bare plural or mass noun) just in case there are instances of the kind. Existential quantification over actual instances is clearly involved in cases like the following:

(56) a. Electrons exist.
b. Unicorns exist.
c. Pink diamonds exists.

[25] One exception is Geach (1968), who suggests that *exist* can apply to bare plurals as well as singular terms for the same reason that a predicate like *disappear* can apply to the two kinds of terms:

(1) a. John disappeared.
b. Dinosaurs disappeared.

Disappear in (1b) acts as a kind predicate in the way of predicates like *widespread* or *extinct*. It does not act as a stage-level predicate applying to kinds on the basis of existentially quantifying over instances.

[26] See also Chierchia (1998) on conditions on bare plurals and mass nouns to be interpreted by existential quantification rather than kind reference.

The existential reading would classify *exist* as a stage-level predicate (and I will later turn to the question of how one can make sense of *exist* acting as a stage-level predicate).

The existential reading is not the only one that *exist*-sentences with bare plurals exhibit, and moreover, it is not one that does not fall under the standard, Carlsonian account of existential readings of stage-level predicates with kind terms given in (44a).

As was mentioned, stage-level predicates also allow for a generic reading, which generally goes along with focusing the predicate. A generic reading in fact is also available in certain *exist*-sentences with bare plurals. For example, (56a) also has the reading 'electrons really exist, and do not just have a theoretical status in science'. (The generic quantifier presumably is restricted contextually, as roughly in 'any electron predicted by theory really does exist'.)

There is another class of *exist*-sentences that display a universal reading with *exist*, namely those involving mathematical objects. Such sentences figure prominently in a recent paper by Fine (2009), who points out that the statement (57a) is intuitively stronger than (57b), that is, (57a) entails (57b), but not conversely:

(57) a. Integers exist.
b. Natural numbers exist.

(57a) appears to claim the existence of every integer, not just some integer (which may in fact be a natural number). By contrast, (57b) claims the existence of only integers that are natural number.

On the view on which existence statements express existential quantification, the converse holds: (57b) would be a stronger statement than (57a).

Fine's use of such examples was to make a general point about ontological commitment, namely that statements of ontological commitment in general involve universal quantification and thus require *exist* to act as a predicate roughly equivalent to *real*. If there are statements of ontological commitment that are universally quantified, as (57a) and (57b) appear to be, then, as Fine argues, statements of ontological commitment involve a domain of entities which may or may not be real and they will state which ones exist, that is, are real. For that reason, *exist* has to be a predicate, in fact a predicate roughly synonymous with *real*. Statements of ontological commitment to kinds thus presuppose a domain of 'light entities' and involve predication of a property of existence of such entities. The logical form of (57a), Fine argues, is then as in (58a), or equivalently as in (58b):

(58) a. For every x (integer(x) → exist(x))
b. For every x (integer(x) → real(x))

(Later I will argue that the semantics of *real* is in fact fundamentally different from that of *exist*, and that it in particular triggers a different reading with bare plurals.)

It does not seem that the universal reading of the examples in (57) is the same phenomenon as the generic reading which *exist* as a stage-level predicate is

predicted to display. The generic reading is marked by a particular intonational pattern and thus results from interpreting the sentence on the basis of a particular intonational structure. By contrast, the universal reading displayed by (57a, b) goes along with an entirely neutral intonation, and moreover, it appears to be the only reading available, which makes its status as a different meaning of the sentences (besides the one involving existential quantification) implausible. It is better regarded a secondary effect of the actual meaning of (57a, b), which would involve existential, not universal quantification. It is a pragmatic effect that goes along with the particular kind of entity the bare plural stands for: In the case of clearly defined mathematical sequences, accepting one simply means accepting all. The same effect in fact is displayed by the corresponding *there*-sentences[27]:

(59) a. There really are integers.
b. There really are natural numbers.

Also (59a) seems to make a stronger statement than (59b).

The universal-quantification effect shows up also with certain kinds of mathematical sets or classes:

(60) a. Geometrical figures exist.
b. Triangles exist.
c. Equilateral triangles exist.

The universal effect is somewhat less obvious in (60b) and still less obvious in (60c). The reason is that (60c), and perhaps (60b), does not so much concern the ontological nature of a geometrical form, but rather there being an example of a geometrical form with a particular specification.

To summarize, *exist* certainly does not always trigger a universal reading with bare plurals, pace Fine (2009). With non-mathematical kinds, an existential reading is clearly the natural reading, whereas with mathematical 'kinds', a universal reading appears to be a pragmatic effect rather than a matter of interpretation. Only

[27] The universal-quantification effect shows up also with *believe in*, a predicate expressing objectual ontological commitment (Szabo 2003):

(1) a. John believes in unicorns.
b. John believes in integers.
c. John believes in natural numbers.

According to (1a), John is right in his belief if there are some unicorns, whereas for John to be right in his belief according to (1b) and (1c) all integers / natural numbers need to exist.

Note that *believe in* does not always require the existence of all or some instances of the kind for the agent to be right in his belief. Given (2), John can be right in his belief even if there were no actual instance of true justice:

(2) John believes in true justice.

the generic reading that is available with *exist* as a stage-level predicate constitutes an interpretation that presupposes a domain of 'light' entities and states that they really exist.[28]

6.3 Existence statements with kind terms and location modifiers

The Carlsonian account in (44a) is not really appropriate for *exist* with bare plurals. (44a) is inappropriate for *exist* with bare plurals describing events (since *exist* does not apply to individual events). Moreover, it is inappropriate for *exist*-sentences with bare plurals and location modifiers (since *exist* with a location modifier cannot apply to particular individuals).

There are also other stage-level predicates whose existential readings with kind terms need not fall under the Carlsonian account in (44a), for example *discover* or *recognize* as below:

(61) a. Joe discovered white gold—in virtue of coming across some instances.
b. John recognized tuberculosis—by examining an instance of it.

Stage-level predicates such as *discover* and *recognize* may be true of a kind in virtue of a weaker condition being true of an instance than that expressed by the predicate. In the case of *exist* applying to kinds of events, the condition would be that of being in the actual world, not that of existing.

Exist with a location modifier thus applies to kinds 'directly', not in virtue of *exist* with the location modifier applying to some instance, which would be impossible. When *exist* applies to kinds, the location modifier will have the function of an argument, not of an adjunct. It could not be an adjunct for the same reason as in the case of *exist* applying to a particular object. In both cases, *exist* describes an abstract state, which fails to have a spatial location. If the location modifier has the

[28] *Exist* also occurs with definite plurals:

(1) The integers exist.

Such sentences have only a universal reading, on which (1) is equivalent to (2):

(2) Every integer exists.

But the logical form of (1) does not consist in universal quantification. Rather it involves plural reference and an obligatorily distributive reading of *exist*:

(3) a. For a plurality x, exists(x) iff for every member y of x, exist(y).
b. A predicate P is obligatorily distributive iff: for any plurality x, P(x) just in case for any member y of x, P(y).

That is, (1) consists in a plural description and a predicate that when applied to the plurality denoted by the description automatically applies to each instance.

status of an argument, then *exist* when applying to a kind must express space-relative existence.[29]

Exist will hold of a kind relative to a location in virtue of an instance of the kind *being at* the location (though not in virtue of an instance *existing at* the location). This will be a consequence of location-relative *exist* applying with its usual meaning to the kind as such, requiring the complete presence of the kind at the relevant subregions of the spatial region in question. A kind is completely present at a location in virtue of being instantiated in an individual at the location. Given the standard understanding of 'complete presence', this should mean that all the parts of the kind be present at the location of the individual instantiating the kind. But what are the parts of a kind? One might think that the parts of a kind are the instances of the kind, a kind being a sort of plurality of all its instances (or possible instances). But clearly not all the instances can be at any location at which a kind is instantiated. In fact, the more common view is that the parts of a kind are the characteristics of the kind, that is, the attributes that together make up the 'essence' of the kind. Complete presence of a kind at a location can be understood as instantiation of all the attributes of the kind in a particular individual at the location.

The space-relative existence of kinds has to go along with a particular semantic account of the location modifier. An existence statement locating a kind at a spatial region such as (50a) does not actually state the complete presence of the kind at each sub-location of the location mentioned by the location modifier. (50a) does not require the complete presence of the kind giraffes in each part of Africa. It is sufficient that the kind be completely present at the locations of the instances of the kind in Africa, and it suffices that there be just some instances of the kind in Africa.

The problem is not one of space-relative existence of kinds as such, but rather one of the semantics of location adverbials in English. A weak, existential condition is part of the semantics of locative and temporal modifiers in English in general, as illustrated below:

(62) a. John resides in Munich.
b. The accident occurred yesterday.

(63) a. Giraffes exist also outside of Africa.
b. Dunes exist only near the sea.

In Munich in (62a) specifies that John's residence is located somewhere in Munich, not that it is located everywhere in Munich or all over Munich, and so for the time of the accident yesterday in (62b). Also the location modifiers in (63a, b) do not give the precise location of the entity in question. Thus, for a term T, *in* T locates an

[29] There are in fact two linguistically relevant notions of a kind: kinds as referents of bare plurals or mass nouns and kinds as referents of definite singular kind terms as in (1) below (Krifka et al. 1995, Introduction). Only the former, not the latter allow for space-relative *exist*, as seen in (2):

(1) The giraffe is a mammal.
(2) a. Giraffes exist everywhere.
b. ?? The giraffe exists everywhere.

entity somewhere in the location that T refers to, *outside* T locates it somewhere outside that location, and *near* T locates it somewhere 'near' that location.[30]

A distinction thus needs to be made between the location mentioned by the location modifier and the *strict location*, the location that is in fact where exactly the entity or event in question is located. The complete-presence condition of *exist* needs to be fulfilled only with respect to the parts of the strict location, not the location mentioned.

With an ordinary location modifier, an existence statement concerning a kind requires just that the kind be instantiated in an individual at some sublocation of the location mentioned by the modifier, the strict location. This does not require that the kind be present at each sublocation of the location of a relevant instance of the kind. The reason is that the location of an instance should count as a minimal location for the kind. Kinds inherit their location from the location of their instances; they cannot have a location in any other way.[31] Thus they could not possibly be located at a proper part of the location of an instance of the kind.

To summarize, space-relative *exist* can apply to kinds because of the particular nature of kinds, their ability to be completely present at different locations at once in virtue of particular individuals instantiating all the attributes of the kind at those locations.

6.4 *Exist* and the individual-level/stage-level distinction

The stage-level/individual-level distinction is a notoriously problematic distinction, and the apparent classification of *exist* as a stage-level predicate highlights some of the difficulties associated with it.

It is wellknown that there are many predicates that seem to express temporary properties but do not trigger an existential reading of bare plurals, for example *nervous, happy*, or *sick*, which contrast with predicates like *available, audible*, or *visible*, which do trigger an existential reading.[32] But still being a stage-level predicate appears a necessary, though not a sufficient condition for an existential

[30] Only special locational modifiers such as *throughout* and *all over* require that every part of the location mentioned is where the entity or event in question is located:

(1) a. Giraffes exist throughout Africa.
b. Giraffes exist all over the world.

This is because such location modifiers are in fact quantificational, containing an explicit quantifier (*all* in (1b)) or implicit quantifier (*throughout*) ranging over the parts of the location.

[31] This matches the Aristotelian view according to which kinds can be multiply located, located just where the instances are located.

[32] Many individual-level predicates trigger existential readings in object position, for example *belong, own, contain,* and *include*. By contrast, the subject position of those predicates goes along with a generic reading:

(1) a. Very rich men own expensive cars.
b. Shells contain pearls.

Thus, the correlation of existential readings with stage-level predicates should be confined to bare plurals in subject position.

reading of a kind term in subject position. The existential reading of *exist* with bare plurals thus classifies *exist* as a stage-level predicate. But how can *exist* be stage-level when its application is never limited to a temporal stage of an individual, but always applies to the individual's entire life-span? One obvious criterion classifying *exist* as stage-level is that *exist* expresses an accidental property when it applies to material objects. Material objects must have the essential properties they have, but they need not have existed. Identifying stage-level predicates with predicates expressing accidental properties and thus individual-level ones with those expressing essential properties is problematic, though. Existence could not be an accidental property of abstract objects such as mathematical objects, which exist necessarily (if they exist).[33,34]

However, in general, it appears that a predicate is classified as either stage-level or individual-level not on the basis of whether or not it expresses a temporary or accidental property of all the objects to which it applies. Rather a predicate is classified as either stage-level or individual-level on the basis of a particular type of object and then the classification is carried over to other objects which the predicate may also apply to. For example, colors are properties that are essential with some entities (paint), but not others (tables); yet bare mass nouns and plurals always display a universal, not an existential reading with color adjectives. For example, (64a) and (64b) could not be true in virtue of an existential reading; they are false and that because only a universal reading is available:

(64) a. Paint is red.
b. Tables are red.

Red always classifies as an individual-level predicate. Predicates classify as either stage-level or individual-level as such, not when applied to one sort of object as opposed to another. For *red,* the type of object on the basis of which the classification as stage-level or individual-level is made consists of essentially red objects; for *exist* it consists of material objects, not abstract objects that exist essentially.

7 The adjective *real*

Exist, we have seen, is a predicate of individuals that holds of an individual if the individual is a presently existing one, and it is false of past, merely possible, as well as intentional objects. Existence as expressed by the verb *exist* thus is not a feature of certain entities, and the lack of existence does not consist in the absence of such a

[33] There are arguably also abstract objects that exist only accidentally, namely fictional characters conceived of as abstract artifacts (cf. Thomasson 1999). Laws and institutions may be other cases.

[34] One might argue that *exist* classifies as an individual-level predicate with abstract objects and that this is in fact the source of the universally quantified reading that *exist* exhibits with mathematical objects. However, I found that speakers generally have the intuition of a primarily existential reading, with the universal understanding being a secondary effect. Moreover, predicates in general do not seem to change their classification as stage-level or individual-level depending on the type of object they apply to (see below).

feature, but rather it has to do with the relation of entities to time and space and with their quasi-representational status. This is also evident when comparing *exist* to the adjective *real*. *Real* contrasts with *exist* in that it does seem to express a quality of objects. Often philosophers assume that *exist* and *real* express the same notion. But *exist* and *real* in fact differ fundamentally, both linguistically and in the sorts of ontological notions they involve.

One major linguistic difference between the predicate *exist* and the predicate *real* consists in their different readings with bare plurals. Whereas *exist* generally triggers a reading involving existential quantification, *real* goes along with universal quantification, as illustrated by the contrast between (65a) and (65b) as well as the one between (66a) and (66b):

(65) a. Prime numbers exist.
b. Prime numbers are real.

(66) a. Electrons exist.
b. Electrons are real.

Obviously, *real* unlike *exist* classifies as an individual-level predicate and not a stage-level predicate.

But how can *real* be an individual-level predicate and differ in that respect from *exist*? If *real* contrasts with the adjective *possible*, it is not obvious at all that it should classify as an individual-level predicate. It would depend on the philosophical view. If what distinguishes a real from a merely possible object is that a real object belongs to the actual world, whereas a merely possible object belongs to other possible worlds, then *real* might classify as stage-level a predicate as a predicate of location—or *exist* for that matter. But if *real* applies to entities whose nature is in some way different from that of merely possible objects (the latter being conceptual entities of some sort, let's say), then *real* would be an individual-level predicate. At the same time, *real* should not be true of past objects, but the nature of past objects is not different from the nature of presently existing ones. Using philosophical considerations alone thus does not lead to a clear classification of *real.*

There is a simpler explanation of the status of *real* as an individual-level predicate. Taking a closer look at its linguistic behavior, it appears that *real* is an adjective that is in fact not that felicitous on its own, but more naturally occurs as a modifier of a sortal noun as in *real object*, *real person*, or *real watch*. In fact, *real* like *fake* is an intensional, nonintersective adjective. This is particularly clear from (67), where *real* and *fake* can be understood only in relation to the sortal noun used, not independently[35]:

[35] Even when *real* occurs on its own, it arguably attaches to an implicit sortal, provided by the context as in (1a); when the context does not provide a suitable sortal, *real* is hard to make sense of, as in (1b):

(1) a. This piece of gold is real
b. This bracelet is real.

Real in (1a) is understood as meaning 'real gold', which is not possible in (1b).

(67) This is a real watch, but a fake Rolex.

In that function, *real* competes with adjectives such as *intentional, fictional, mythical,* and *possible*, which also naturally occur as modifiers of sortal nouns, as in *fictional person*, *intentional object*, or *possible solution*.[36] The explanation of the status of *real* as an individual-level predicate is then obvious: *real* in general is followed by an explicit or silent sortal noun N and the resulting complex predicate *a real* N is an individual-level predicate because N is. Sortal nouns are always individual-level.[37]

The difference between *exist* and *real* is also reflected in the corresponding nominalizations. In (68a), the existentially quantified complement of *reality* takes obligatory wide scope, whereas in (68b) the existentially quantified complement of *existence* can take narrow scope[38]:

(68) a. John denies the reality of a witch.
b. John denies the existence of a witch.

(68a) has only the reading on which for some witch x, John denies the reality of x, and (68b) has only the reading on which John denies that a witch exists. In (68a), the denial targets a feature of a given witch, that of its reality; in (68b), the denial focuses on there being a witch, not on a given feature that a witch may or may not have. 'Reality' is something only an entity can have that already has some form of being, whereas 'existence' is something that goes along with the entity itself.[39] *The reality of a witch* acts as a term referring to a feature of an individual whose

[36] Some of those adjectives have the semantic status of operators: if an object x is a 'real object', this means that really (in reality), x is an object; when an object x is a 'fictional person', this means that in some piece of fiction, x is a person; which means the operator here serves to permit ascription of properties to a fictional object as attributed in the story or myth. *Intentional* and *possible*, by contrast, do not act as operators but as intensional functors, mapping a sortal property onto a property of intentional or possible objects. If x is an intentional object, then x is constituted by intentionality alone; x is not such that it is 'intended' to be an object. If x is a possible house, then x is not something such that it is possibly a house; rather, x belongs to some possible world in which it is a house.

[37] With a phase sortal as in *real teacher* and *real passenger*, *real* targets the 'phase content' of the noun, not the sortal content (a *real teacher* is a person that really is a teacher, not someone that really is a person and teaches). Thus *real* would rather make a 'stage-level' contribution to the complex nominal. Nonetheless, *real teacher* and *real passenger* classify as individual-level predicates in that they trigger generic quantification with a bare plural:

(1) Employees of this school are real teachers.

The individual-level status of *real teacher* or *real passenger* therefore should be traced to the sortal content of the head noun, not the contribution of *real*.

[38] There is no obligatory wide scope of the complement with the bare plural, though, as was pointed out to me by Richard Kayne:

(1) John denies the reality of witches.

This matches the status of *witches* as a kind-referring term.

[39] This contrast with the view of Avicenna, who apparently held that existence was an accidental 'feature' of entities, that is, a trope. Entities for Avicenna are possibilia defined by their 'essence'.

existence is presupposed. In that respect, it acts just like any other term referring to a 'feature' or 'trope'. It acts, for example, like *the qualification of a candidate*, which contrasts in the same way with *the existence of a candidate*:

(69) a. John denies the qualification of a candidate.
b. John denies the existence of a candidate.

Thus, existence and reality are fundamentally different notions, or so natural language tells us.

8 Conclusion and outlook

Part of the purpose of this paper was to explore what sorts of ontological notions are reflected in the semantics of statements of existence in English. The ontological picture arrived at is one in which a distinction between endurance and perdurance plays a role as well as particular notions of abstract states and kinds (in a roughly Aristotelian sense of a universal). In that respect, the contribution of this paper falls within descriptive metaphysics pursued in a fully systematic way. Descriptive metaphysics, as Strawson (1959) introduced the term, is the project of uncovering the ontological scheme that is reflected in our use of natural language. Descriptive metaphysics need not be tied to the view that the ontology reflected in natural language is the 'right' ontology; it is not necessarily in conflict with a project based on 'purely' philosophical considerations (should that be possible) or 'revisionary metaphysics', to use again Strwason's term. There may be other ontologies, driven by different interests. But certainly if one appeals to natural language in order to motivate an ontological view, then it should be made in a fully systematic way, by taking into account the developments of contemporary linguistic semantics. This is what this paper tried to do.

The paper has focused on *exist* and *occur* with their time- and space-relative uses. One observation not discussed in the paper is that *exist* also applies to abstract objects, whereas *occur* does not. The time- or space-relative meaning of *exist* could straightforwardly apply to abstract objects as well, since abstract objects arguably are completely present throughout time and space. *Occur* would not be applicable to abstract objects since abstract objects could not have temporal parts.

The generalizations established in this paper raise an obvious question about their crosslinguistic generality. It is an implicit assumption not just in generative syntax but also in linguistic semantics that a deeper analysis of phenomena in a given language reveals something universal that is likely to be shared by languages in general. Nonetheless, it will be of significant interest to see how other languages behave with respect to the expression of existence, for example whether they generally distinguish two sorts of existence predicates that correspond to English *exist* and *occur*. Languages clearly differ in the sort of existence predicates they have, and it will be of great interest to see what the range of ontological distinctions

may be that natural languages display by differentiating among different existence predicates.[40]

The paper did not much address the semantics of negative existentials (in fact it remained entirely neutral as to the right account of negative existentials). An interesting question still to be pursued is whether the space- and time-related meanings of existence predicates could be linked to their peculiar behavior under negation.

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Appendix: The linguistic plausibility of views on which *exist* is not a first-order extensional predicate

This appendix will briefly discuss two views according to which *exist* is not a first-order predicate. It will restrict itself entirely to the question whether those views are plausible linguistically.

Exist as a second-order predicate

For Frege (1884), *exist* is a second-order predicate: it takes a predicate or concept-denoting expression and states that its extension is nonempty. Thus, in (1), *exist* would state that the extension of *king of France* is nonempty[41]:

(1) The king of France exists.

This view has been criticized extensively by philosophers (Salmon 1987, 1998; Miller 1975, 1986, 2002). For the view to be plausible linguistically, there should be independent motivations that a predicate such as *exist* can go along with a concept-denoting expression as subject and moreover that definite descriptions can act as concept-denoting. While a function of definite descriptions as predicates and thus as concept-denoting is plausible (Fara 2001), proper names do not seem to generally be able to be reinterpreted that way.

Turning then to the predicate *exist*, the question to ask is: are there other second-order predicates in natural language that go together with concept-denoting subjects or complements, and does *exist* behave like those predicates? A second-order predicate in natural language would be a predicate that requires, as complement or subject, adjectives or predicative NPs, such as a copula verb:

[40] Nosu, a Tibetan-Burmese language, is a language that is reported to have at least 13 different existence predicates (Walters 2006).

[41] Similarly, Russell (1905) takes *exist* to be a predicate of 'propositional functions'.

(2) John became a man.

The question thus is, does the subject of a sentence with *exist* have the same predicative status as the complement of a copula verb? The answer is clearly negative. *Exist* does not occur, on the relevant interpretation, with complements that could qualify as predicates, such as indefinite singular NPs. (3a), for example, does not just claim the nonempty extension of the concept denoted by *man*, in the way (3b) and (3c) do:

(3) a. A man exists.
b. Men exist.
c. There is a man.

Thus, the view that *exist* has the status of a second-order predicate lacks linguistic plausibility.

Exist as an intensional predicate

Another alternative to *exist* being a first-order predicate is that it is an intensional predicate. That is, *exist* as in (4) would apply to the intension of the subject, let's say an individual concept, a (partial) function from possible worlds to individuals:

(4) The king of France exists.

Exist on this account is true of an individual concept I at a time t in a world w iff I is defined at t in w. But does *exist* really classify as an intensional predicate?

When it comes to the notion of an intensional verb, different types of intensional or apparent intensional verbs need to be distinguished. In what follows, I will make use of distinctions introduced in Moltmann (1997, 2008).

One type of intensional verb, verbs like *resemble* or *compare to*, simply takes predicative complements. Such verbs are thus second-order predicates of another sort than copula verbs, and we have seen that *exist* does not pattern with those.

The second type of intensional verb includes *need, look for, recognize,* and *own*. Such verbs are characterized by a certain nonspecific reading of the complement and a general restriction to weak NPs as complements. The latter constraint manifests itself in that even if uniqueness were to be fulfilled (in the relevant worlds), an indefinite is required for the intensional reading (Moltmann 1997):

(5) a. John needs a wife.
b. ?? John needs his wife.

(6) a. The institute needs a director.
b. ?? The institute needs the director.

Obviously, *exist* is not subject to the restriction to weak NPs. Another peculiarity of intensional verbs of the second type (shared by the first type in fact) is the possibility of the complement being substituted by a 'special quantifier' such as

something (Moltmann 1997, 2008). Special quantifiers are neutral in gender, and they can replace the complement of an intensional verb even if that complement is not neutral:

(7) a. John needs something/??? someone—a wife.
b. Something/??? Someone is urgently needed—a plumber.

It is easy to see that *exist* does not pattern with intensional verbs in that respect. The subject of an *exist*–sentence cannot generally be replaced by a special quantifier, namely not when the subject fails to be neutral:

(8) ??? Something/Someone does not exist anymore—the king of France.

Thus, *exist* does not classify as an intensional verb like *need.*

There is another type of potential intensional verb that *exist* might pattern with. These are verbs like *change* and *is rising*, which have been taken to apply to individual concepts in the sentences below (Montague 1973)[42]:

(9) a. The director changed.
b. The temperature is rising.

However, *exist* does not naturally apply to the kinds of entities that *change* and *is rising* can apply to:

(10) a. ?? The director always exists. (meaning 'there is always some director or other')
b. ?? The president now exists; he did not exist for a few years.

There are some cases where *exist* appears to apply to the intension of an NP. First, *exist* apparently applies to the intension of the complement of an intensional verb like *need, ask for*, and *see* in cases such as the following:

(11) a. What John needs exists.
b. Everything John asked for exists.
c. What John saw exists.

[42] There is evidence that these are not intensional verbs, that is, verbs that apply to the intension rather than the extension of an argument. The subject of sentences with such verbs as predicate cannot generally be replaced by a special quantifier. Thus, (1b) as a continuation of (1a) is infelicitous:

(1) a. The president is elected every four years.
b. Something is elected every four years.

Moreover, replacement of the subject by the special pronoun *that* is not acceptable, but only replacement by the non-neutral pronoun *he* is:

(2) The president is elected every four years. He / ??? That is not elected every three years.

This is an indication that the subject in (9a)–(9c) in the text, rather than denoting its intension, in fact stands for a particular type of 'variable' object.

There is evidence, however, that the subject in (11a, b) in fact does not stand for the intension of an NP, but rather for a *kind*, that is, what a bare plural or mass noun stands for. Thus, while (12b) as a continuation of (12a) is perfectly fine, (12c) is not. It is just as bad as (12d), whereas (12b) is just as good as (12e):

(12) a. John is looking for a tiger.
b. What John is looking for exists.
c ?? What John is looking for exists, namely a tiger.
d. ?? A tiger exists.
e. Tigers exist.

As Carlson (1977) argued, when an intensional verb takes a bare plural or mass noun as complement, then in fact the verb does not take an intension as argument, but rather a kind, as denoted by the bare plural or mass noun. Thus, in (11a) *what John needs* better stands for a kind rather than an intension, and so it is the kind and not the intension that *exist* applies to. This means that *exist* in (12b) applies with the meaning with which it applies in (12e), in an existence claim about a kind.

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