Reference to *ad hoc* kinds

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Abstract

Although there is no consensus about what kinds are, there is a common understanding that kinds can be regarded as collections of objects that share certain properties. What these properties exactly are is often left unspecified. This paper explores the semantics of *ad hoc* kind-referring terms, where the determination of the relevant set of shared properties does not rely on "natural" properties or world knowledge. Rather, information provided by a nominal modifier, typically a relative clause, is used to impute the required regular behavior on the kind-referring NP. Building on Carlson's (1977b) disjointness condition, I show that we can not only account for the ubiquity of these expressions, but we can also extend the analysis to other constructions that have traditionally not been taken to be kind-referring, such as Amount and Degree Relative constructions.

1 Introduction

It is a well-known property of ordinary nouns that they can refer to particular *objects* as well as *kinds*. The oft cited example in (1) illustrates the difference (Milsark 1974, Carlson 1989).

(1) Typhoons arise in this part of the Pacific.

a. *Object-referring interpretation*
This part of the Pacific has the property that some typhoons arise in it.

b. *Kind-referring interpretation*
It is a property of typhoons that they arise in this part of the Pacific.

The example above is ambiguous, as the bare NP *typhoons* may have an existential or a generic interpretation. The existential reading is one where this part of the Pacific is such that typhoons can arise there. This is a case of *reference to objects*, where *typhoons* simply ranges over object-level typhoons. The generic reading, on the other hand, is an instance of *reference to a kind*,

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and conveys that it is a characteristic property of typhoons to arise in the relevant part of the Pacific.

It is generally thought that kinds are representative of perceivable commonalities that hold of a collection of objects, i.e. regularities that occur in nature. As Chierchia (1998, 348) puts it, the only property of kinds is that "we can impute to them a sufficiently regular behavior". Beyond this, there is no agreement as to what counts as a kind. A number of fundamental questions remain open: (*i*) What is a kind? (*ii*) What NPs can refer to kinds? (*iii*) What are the constraints, if any, on kind referring terms? This paper aims at contributing to our understanding of kind referring terms by looking into cases where kind reference relies on regularities that are not immediately obvious, in the sense that they are not agreed upon in the same way as natural or well-established kinds. I refer to these throughout as *ad hoc* kinds.

1.1 Ad hoc *kinds*

By referring to *ad hoc* kinds we are allowed to disregard natural regularities and spontaneously build kinds in real time. That is, even though in the general case what counts as a kind is not set by the grammar, certain grammatical constructions allow us to refer to kinds that are neither natural nor pre-established within a speaker community. The most common case of *ad hoc* kind reference is perhaps that of anaphoric demonstratives that explicitly refer to a kind (Umbach and Ebert 2009, Umbach and Gust 2014):

(2) a. These lions are widespread.

b. These dogs are annoying.

(3) a. This kind of lion is widespread.

b. This kind of dog is annoying.

Both pairs of examples above can be used to refer to a specific kind of lions and dogs by anaphorically referring back to a previously mentioned subkind. The properties attributed to the kind at hand need not be natural or well-established in these cases; as long as speakers know what the referred kind is in the context, the object of the conversation could be any type of lion/dog.

A second way to refer to an *ad hoc* kind is by explicitly mentioning what the relevant criterion is in order to establish the referent of the kind in question. This is possible by modifying a kind-referring term with a relative clause. As a means of illustration, consider the following examples.

(4) a. The lions that eat people are widespread.

b. The dogs that bite are dangerous.

The two examples above can be understood as making a claim about a particular (sub)kind of lion and dog. The lions that eat people, for instance, do not form a natural (taxonomic) class,

in fact they may comprise of individual lions in several subspecies of lion and exclude others in the same subspecies. And yet we can easily refer to the subkind of lions whose regular behavior relies on a particular aspect that they all share, as idiosyncratic as that property–like the fact that they eat people–may be.

Similar remarks can be made of the dogs in (4b), which refers to a kind of dog whose instantiations can be extremely heterogeneous. I will argue that this type of *ad hoc* kind reference allows us to impute a regular behavior to some subset of a kind in real time, without any prior agreement as to whether the behavior in question actually qualifies as sufficiently regular. This is a very useful mechanism if, with Carlson (1977b), Chierchia (1998) and others, we believe that what counts as a kind is not set by the grammar, but amounts instead to conventional knowledge of a community of speakers. It allows us to talk and ask questions about very specific kinds in a straightforward way.

1.2 The connection to amounts/degrees

Not only does *ad hoc* kind reference of this sort allow us to rapidly and efficiently construct kinds "on the fly", it also allows us great flexibility as to what the common thread among the kind members may be. Possessing a certain trait or being prone to a certain type of behavior (e.g. eating people, biting) are natural candidates, but members of the same *ad hoc* kind may be unified by any number of things, not just the most natural ones, including for instance being of the same size or height. In the latter half of the paper, I capitalize on this flexibility to argue that a seemingly unrelated construction, Amount/Degree Relatives (Carlson 1977a, Heim 1987, Grosu and Landman 1998, a.o.) are also a case of *ad hoc* kind referring terms. Consider:

(5) It will take us the rest of our lives to drink the champagne they spilled that evening.

On its most accessible interpretation, (5) describes the task of drinking the amount of champagne that was spilled that evening, not the particular object-level champagne. Amount relatives like (5) then, which also involve NPs modified by a relative clause, seem to refer to amounts rather than objects and thus have traditionally been considered degree constructions and analyzed using the tools of degree semantics (von Fintel 1999, Grosu and Landman 1998, 2017, Herdan 2008, Meier 2015 a.o.). Taking as my starting point an important early observation by Carlson (1977a), who noted that relative clause constructions which allow amount readings in English also have kind readings, I argue for the generalization in (6):

(6) The AMOUNT ⊆ KIND generalization:
Amount interpretations of relative clauses are a form of kind interpretation.

The general intuition is the following. The *ad hoc* kind interpretations prompted by relative clauses in (4) and (5) highlight some relevant property that holds of the referent of the relative clause. This property is used to attribute to the kind referring term the sufficiently regular behavior that it requires to be understood as kind referring. Paraphrasing:

(7) a. It would take us years to drink the champagne that we spilled last night.
⇝ It would take us years to drink champagne with some relevant property of the champagne we spilled last night

b. $[_{\text{DP}}$ the champagne that we spilled last night $]$ ↭ champagne with property $\mathbb{P}$
[where "the champagne that we spilled last night" is a realization of $\mathbb{P}$]

Since the relevant property $\mathbb{P}$ that serves to single out the referred kind is unspecified, it could be anything that is supported by the current circumstances, and so it may well be a gradable property like *be* d-*dry*, and *be* d-*much*, as well a non-gradable property, like *be produced in Alsace*, or a more common taxonomic property of champagne kinds, like *be a prestige cuvée*. In this fashion it is possible to capture amount interpretations of relative clauses like (5) by the same means required to account for *ad hoc* kind reference. In short, what I am arguing is that the correct theory of the *ad hoc* interpretations in (4) should also be thought of as a theory of (5), and moreover that appealing to degrees–understood in the traditional sense of Seuren (1973), von Stechow (1984), a.o.–to account for the latter is not only unnecessary, but also undesirable.

Outside of amount relatives, constructions that display conspicuous similarities between degree and kind readings involve "concealed exclamatives" or DP complements to predicates that embed *wh*-expressions (Castroviejo and Schwager 2008 and Schwager 2009), similarity demonstratives such as English *such*, German *so* and Polish *tak* (Umbach and Ebert 2009, Umbach and Gust 2014, Anderson and Morzycki 2015) and nominals like *amount* (Scontras 2017). Some of these authors, notably Anderson and Morzycki (2015) and Scontras (2017) have developed new conceptions of degrees and even come to the conclusion that degrees are indeed kinds. The goals of the present paper are more modest: my intent is not to advance a proposal about the nature degrees itself, though it is certainly compatible with the approaches mentioned above. Nonetheless, the "reductionist" view advocated here is in the spirit this works and contributes to a general understanding of the relationship between kind and degree referring expressions.

1.3 The plan

The plan for the rest of the paper is the following. In Section 2, I briefly discuss the different kind referring terms in English and argue that definite descriptions with the definite article and a NP modified by a relative clause–of the form *the NP Relative Clause*–can potentially refer to kinds. Section 3 presents a neo-Carlsonian analysis of *ad hoc* kind reference, by reinterpreting Carlson's (1977b) disjointness condition in terms of partitions. Section 4 shows that by appealing to partitions and adopting a notion of degrees where they are represented as equivalence classes *á la* Cresswell (1976), the semantic properties of amount interpretations fall out naturally from the idiosyncratic properties of *ad hoc* kind referring terms. To complete the argument, Section 5 provides a series of arguments showing that classical degree-based ap-

proaches cannot be on the right track, since amount interpretations of relative clauses do not show any of the hallmark features of degree constructions, such as comparatives, equatives and *how many* questions.

2 The form of *ad hoc* kind-referring terms

As a starting point, I want to demonstrate that the nominals of interest in this paper, DPs of the form *the NP Relative Clause*, can be in fact kind-referring. Showing this is pertinent in light of the traditional view that there are only three types of expressions with the potential to refer to kinds: bare plural NPs (8a), singular definite descriptions (8b) and singular indefinite descriptions, (8c); plural definite descriptions with a definite article, which occupy us here, are not included in this list.

(8) a. Lions like to eat zebras.

b. The lion likes to eat zebras.

c. A lion likes to eat zebras.

Despite the *prima facie* equivalence of the three types of expressions in (8), Krifka et al. (1995) have argued that we should distinguish the first two from the third. The first reason they provide is that singular indefinite descriptions are ungrammatical with kind-level predicates, i.e. predicates that only apply to kinds of things, like *be extinct* or *be widespread*.

(9) a. {The dodo / Dodos} are extinct.

b. *A dodo is extinct.

Second, the fact that only the indefinite variant in (10b) below can be interpreted generically is taken as an indication that *a green bottle* is not a generic NP, but simply nonspecific, and its genericity comes about by the virtue of (10b) being a characterizing sentence.

(10) a. The green bottle has a narrow neck.

b. A green bottle has a narrow neck.

Thus, we should distinguish between genuine kind terms like (8a), (8b) and (9a) from generic statements that nevertheless do not involve a kind-referring DP, such as (10b). As a consequence, we may wonder whether the subjects of sentences like (4)–repeated below–are truly kind-referring terms, or simply generic (characterizing) statements in the sense that Krifka et al. (1995) talk about singular indefinite description in (10b).

(4) a. The lions that eat people are widespread.

b. The dogs that bite are dangerous.

We can show that this type of plural modified definite descriptions are in fact genuine kind-referring DPs in the relevant respects. The compatibility of these expressions with kind-level predicates, as shown in (4a), provides the first argument that this must be so.[1] Moreover, notice that substituting the definite article for an indefinite in (4) has clear semantic effects, resulting in ungrammaticality only in the case of the kind-level predicate *be widespread*.

(11) a. *A lion that eats people is widespread.

b. A dog that bites is dangerous.

This contrast suggests, in line with Krifka et al.'s (1995) conclusions, that singular indefinites are not truly kind-referring terms. The genericity of (11b) rests, at least partially, on the non-specificity of the indefinite description. By the same token, definite DPs with an NP modified by a relative clause like those in (4a) can be thought of as being truly kind-referring.[2]

In addition, true kind-referring terms are not limited to combining with kind predicates, and so they may retain their kind-referring properties with non-stative predicates like *reach Australia* (Krifka et al. 1995, ex. 28).

(12) a. The rat was just reaching Australia in 1770. ✓ kind

b. A rat was just reaching Australia in 1770. ✘ kind

Definite DPs modified by relative clauses also allow kind reference in the same environments: below, *the rats that transmitted leptospirosis* can be understood as a specific kind of rats, precisely those that carry and transmit leptospirosis, which need not belong to any one taxonomic kind of rat.

(13) The rats that transmitted leptospirosis were just reaching Australia in 1770. ✓ kind

The conclusion to be extracted from this discussion is that there are environments where the definite article is used as part of a true kind-referring term (fn. 1). In the particular case of

1 Although it is often noted that unmodified plural definite descriptions–at least those using the definite article–lead to ungrammaticality, the restriction is not absolute; compare the following pairs.

(i) a. (#The) lions are widespread.
b. (#The) dinosaurs are extinct.

(ii) a. Unlike other types of big cats, (the) lions come in several varieties. [Barbara Partee, pc.]
b. (The) dinosaurs became extinct at various points in time. [Dayal 2004, 425, ex. 51b]

2 Cases of nonspecific definite descriptions–as in *they'll never find the man that will please them* (von Heusinger 2002) do not involve genericity. It was to account for examples like (10b) that the generic operator GEN was first postulated; see Krifka et al. (1995) and Abbott (2010, §10) for discussion. If GEN is taken to be a quantifier with the ability to bind variables, then the effects of the indefinite determiner in (10b) and (11b) are unsurprising, given its susceptibility to be bound by operators external to them. In this respect, definite descriptions are not equally susceptible to the action of external operators.

modified plural definite descriptions–of the form *the NP Relative Clause*–, they can be used to refer to *ad hoc* kinds by mentioning some property that expresses a relevant regularity definitory of the kind in question. This gives us a general schema of what is needed to form an *ad hoc* kind-referring term: (*i*) a semantic sortal–something to be a kind of–, and (*ii*) some means to identify what the relevant subkind is, to identify its sufficient regular behavior. (*i*) is provided by a kind-referring noun. Anaphors and demonstratives, but also relative clauses, PPs and other modifiers like adjectives can accomplish (*ii*).

3 A partition analysis of *ad hoc* kind reference

English allows the possibility of constructing *ad hoc* kinds by further modifying a kind denoting NP. The goal now is to construct kind-referring terms in real time, without prior agreement as to whether the purported kind should count as one. To achieve this result, I start first by discussing the disjointness condition, a constraint on kind reference first noted by Carlson (1977b). I propose to recast this constraint on kind reference in terms of partitions, a switch that comes with additional benefits, as will be shown in §4.

3.1 The disjointness condition

The noun *kind* can be used to talk about both natural subkinds, like bull-dogs and beagles, as well as *ad hoc* subkinds, as in *the kind of dog that greets you at your door* (see also fn. **??**). But, despite its flexibility, the noun *kind* can only refer to subkinds whose realizations are disjoint. As an example, consider (14) below, from Carlson (1977b, 212). Fido is a border collie (a kind of dog) and a watch-dog (another kind of dog). And yet (14) cannot be used to describe a situation as in (14b) where only Fido is sitting in the next room, despite the fact that Fido instantiates both subkinds in real life.

(14) Two kinds of dogs are sitting in the next room.

a. ✓There are three bull-dogs and two beagles in the next room.

b. ✘There is only Fido, who is a border collie and a watch-dog in the next room.

From this Carlson concludes that using the noun *kind* to quantify, count or refer to subkinds of a kind requires that these subkinds be disjoint. That is, in this case, the same dog cannot exemplify two different subkinds of dog. A second well-known example illustrative of this requirement, also by Carlson, is the unavoidable implication in (15) that Ford cars do not run right.

(15) There are two kinds of cars in the world, cars that run right and Fords.

This disjointness constraint is spelled out as follows (adapted from Carlson 1977b, 213):

(16) Disjointness Condition: A kind-referring expression can only refer to a contextually defined subset of all the possible subkinds that the noun is true of, such that:

i. the subkinds in this subset are disjoint and share no realizations,

ii. the subkinds collectively cover all the space of realizations of the kind.

It is worth emphasizing that the disjointness condition seems to be a grammatical constraint, a limitation imposed on how kind reference works, not a limitation on what counts as a kind in real life. After all, Fido counts in the real world as many kinds of dog; we just cannot refer to them at once. Reference to subkinds–in a single proposition, that is–must occur one at a time, and it is limited to having non-overlapping realizations.

Thus, it seems as though kind reference imposes certain *semantic* conditions on how we structure the domain. This condition is encoded as a lexical-semantic constraint on the word *kind* by Carlson, but I will diverge from him here and take it to be a general constraint on subkind reference. To do so, I recast disjointness in terms of partitions, which is discussed in more detail below.

3.1.1 Partitions

We first introduce the notions of equivalence relation and equivalence class. An *equivalence relation* is a reflexive, symmetric and transitive relation that determines whether any two subsets are sufficiently equal with respect to some measure.[3] For instance, the equivalence relation *be as old as* holds of all twins, but it does not hold of any parent-child pairs.

(17) *Equivalence Relation:* Let R be an equivalence relation. Then:
$a \simeq_R b$ iff $\forall x[(R(a,x) \leftrightarrow R(b,x)) \wedge (R(x,a) \leftrightarrow R(x,b))]$

An *equivalence class* collects in a set all the elements that are equal with respect to some equivalence relation. In our previous example, it would return the set of all things that have the same age. Thus, if R is an equivalence relation, $[x]_R$ represents the equivalence class containing x, such that if y is also a member of $[x]_R$, then $[x]_R = [y]_R$. Equivalence relations induce *partitions* in the usual way.

(18) *Equivalence Class:* Let $[\ ]_R$ be a function from a domain D to $POW(D)$ such that:
$\forall x \in D[[x]_R = \{y : y \in D \wedge x \simeq_R y\}]$

(19) *Partition*: Let A be a non-empty set. A partition is a collection of subsets of A iff (i) for any two subsets X and Y, $X \cap Y = \varnothing$ and (ii) the union of all subsets of A equals A.

Each subset that is a member of a partition of A is called a *cell*, and so any two members x and y can only be in the same cell if and only if they are related by R. Similarly, the collection of all

3 For instance, assume that A is a non-empty set and let R be a relation in A. Then: R is *reflexive* iff $\forall a \in A[R(a,a)]$; R is *symmetric* iff $\forall a, b \in A[R(a,b) \rightarrow R(b,a)]$; and R is *transitive* iff $\forall a, b, c \in A[R(a,b) \wedge R(b,c) \rightarrow R(a,c)]$.

the equivalence classes on A with respect to R forms a partition: every member of each equivalence class $[x]$ is related to every other member of $[x]$ via R and not related to any member of any other set. A partition is simply a collection of all equivalence classes arising from some equivalence relation.

(20) *Collection of Equivalence Classes on D:* $\{X \subseteq D : \exists x \in D_R[X = [x]_R]\}$

As an illustration, let us return to Fido in (14). Given the equivalence relation *be the same breed as*, Fido is a member of the cell containing border collies, the equivalence class $[Fido]_{breed}$. By the same token, if the equivalence relation were *have the same role as*, Fido would be in the cell containing watch dogs, $[Fido]_{role}$. Given the properties of partitions, Fido cannot live in two cells at the same time, and so we have to chose one or the other equivalence relation. Hence the ill-formedness of (14) above.

3.1.2 Back to *ad hoc* subkinds

Let us return now to *ad hoc* kinds. We started by asking about how we are able to construct true kind referring terms in real time, when it seems that the very notion of "kind" relies on tacit agreements among speakers. We can now answer this question by appealing to partitions. The working hypothesis is that all instances of kind reference in natural language require a suitable equivalence relation that projects a partition.

Ad hoc kind-referring expressions do not refer to kinds in a direct way. To see this intuition, compare the natural (taxonomic) subkind *African lion* in (21a) with the *ad hoc* subkind of *lions that eat people* in (21b).

(21) a. The African lion is widespread.

b. The lions that eat people are widespread.

One can refer to a kind by directly mentioning its name. In this case, *African lion* stands for a (taxonomic) subkind of lion. But not all subkinds have names; in fact, very few do. For all we know, the kind of *lions that eat people* could be *African lions*, but this is not necessary. The kind term *lions that eat people* refers to a subkind of lions that qualifies as such just by virtue of eating people. In this case, then, the "sufficiently regular behavior" that we may impute to them is precisely that they eat people.

I suggest that the sole role of the relative clause in *ad hoc* subkind reference constructions is to provide information that helps determine what the relevant sufficiently regular behavior is. How exactly does the relative clause fulfill this role? It does so by restricting, in more or less the usual way, the denotation of the kind-denoting NP, e.g. *lions* in (21b), to a subset of lions. Crucially, this subset must be a member of one cell in a partition of lion subkinds. Given the nature of partitions, information about one cell helps us form at least a bipartition, for instance, lumping together in one cell the individual lions that eat people, and all the ones that do not

belong in this cell occupying the sole other cell of the partition. The more information we have about the subject matter, the richer the partition could be.

Under this view, a critical part of resolving *ad hoc* kind reference is being able to determine an equivalence relation that puts all the relevant subkind realizations in a single cell. Of course, partitioning the domain in this way is a prerequisite for reference to well-established kinds, as well. However, by assumption, with well-established kinds, it is shared knowledge among speakers (*i*) that the instantiations of the kind possess the required regular behavior and (*ii*) what this behavior might be (taxonomic, functional, etc.). Thus, additional contextual cues are unnecessary. However, with *ad hoc* kind-referring terms, it becomes necessary to supplement the information provided by the kind-referring NP in some way such that the listener can reconstruct the intended partitioning of the domain. Looking at kind-referring terms as inducing a partition on the domain allows us not only to recast Carlson's (1977b) disjointness condition in a general and principled way, but also gain insight into the role of the relative clause (or modifiers more generally) in the complex cases of *ad hoc* kind reference under consideration here.

3.2 *Implementation*

3.2.1 The basics of kinds

In laying out my assumptions about kind reference I am following Chierchia (1998) for the most part.[4] I assume that kinds are individuals whose spatiotemporal manifestations are discontinuous. In this sense, they are like plural individuals, which do not form a whole; the kind *dog* can be identified as the sum of all individual dogs, which can then be modeled as the largest member of the plural individual comprising all dogs.

For the majority of properties, like the property of being a dog, there is a corresponding kind, the dog-kind. Conversely, natural kinds have a corresponding property (the property of belonging to that kind). Chierchia's (1984) system exploits this correspondence, and permits systematic mappings from properties to their individual correlates via a nominalization function, the "down" operator $^{\cap}$, a "nominalizer". Likewise, individuals may be mapped to their corresponding properties via the inverse of $^{\cap}$, the "up" operator $^{\cup}$, a "predicativizer".

(22) ***Property–kind mappings***

a. *Predicativization*
Let d be a kind. Then for any world/situation s, $^{\cup}d = \lambda x\,.\,x \leq d_s$, if d is defined, false otherwise (where d_s is the plural individual that comprises all of the atomic members of the kind).

b. *Nominalization*

4 Nothing of consequence for the derivation of *ad hoc* kind reference bears on the particular implementation that I offer here. I have tried to favor standard or better known positions whenever possible.

For any property P and world/situation s, ${}^{\cap}P = \lambda s\,.\,\iota P_s$ if $\lambda s\,.\,\iota P_s$ is in K; else undefined (where P_s is the extension of P in s and K is the set of kinds).

The system now provides two different ways to look at properties. Kinds *qua* predicable entities are essentially incomplete or "unsaturated" in the Fregean sense, very much like run-of-the-mill properties. However, just like properties (e.g. *run*), kinds can be nominalized and so turned from predicative into argumental objects (e.g *the running*), thereby living a second live as individuals. This individual objects are usually referred to as the individual counterparts of kinds.

At this point it helps to lay out the two relevant subsets of the domain D, along with the variables I will use for each type. Kinds are individuals with their own rights, and so they belong to their own domain D_k, a subset of D.[5] In order to represent kinds and object variables, I follow the convention, after Carlson (1977b), of using the subscripts k for kind-level and o for object-level variables. Thus, we can talk about the domain of object-individuals D_o, to the exclusion of the domain of kind individuals, D_k. Following the usual convention, I use small caps to name a kind, such that DOG is the dog-kind. Thus, the dog-kind DOG is equivalent to the nominalization of the property of being a dog, (23a). Conversely, the property of being a dog is equivalent to the predicativization of DOG.

(23) a. $\textsc{dog} = {}^{\cap}\lambda x\,.\,{}^{*}dog(x) = {}^{\cup}({}^{\cap}\textsc{dog})$

b. ${}^{\cup}\textsc{dog} = \lambda x\,.\,{}^{*}dog(x) = {}^{\cup}({}^{\cap}\lambda x\,.\,{}^{*}dog(x)) = \lambda x\,.\,x \leq \textsc{dog}$

Kinds have the possibility to combine both with kind-level and with object-level predicates. In the first case, kinds are attributed some property directly by the main predicate, (24a). In the second case, most commonly with episodic sentences, we encounter a mismatch between a kind denoting argument and a predicate that lexically selects for non-kind predicates, (24b).

(24) a. Dogs are {widespread/extinct/common}.

b. Dogs are barking outside my window.

Example (24a) is a case of direct-kind reference: the dog-kind, the individual correlate of the property of being a dog, is taken directly as an argument by a verb that selects for kinds. To derive this interpretation, we simply apply the kind denoting term to the predicate.

(25) $[\![(24a)]\!] = extinct(\textsc{dog})$

The example in (24b) is different in that now the dog-kind serves as an argument to an individual-selecting predicate. In this case, the predicate does not attribute properties to the dog-kind,

5 This ontology requires particular versions of set theory that I will not discuss here (Chierchia and Turner 1988). In short, kinds D_k are assumed to be both a subset of the atomic individuals in D as well as a subset of the intension of D, D_s. But the cardinality of D_s turns out to be greater than D and so we have to make sure that D_k, which comprises of intensional individuals, is not so big that it does not fit into D.

but to object-level instances of the dog-kind; (24b) asserts the existence of some individual dog that is barking. In other words, the sentences existentially quantifies over individuals that belong to the dog-kind and attributes them the property of being barking outside my window. To achieve this result, Chierchia (1998) proposes a new rule of composition:

(26) Derived Kind Predication (DKP):
If P applies to objects and k denotes a kind, then $P(k) = \exists x[^{\cup}k(x) \wedge P(x)]$

The rule DKP solves two problems: it provides a means to solve the sortal mismatch and introduces existential quantification over instances of a kind.

(27) $[\![(24b)]\!] = \exists x[^{\cup}(^{\cap}\lambda x\,.\,{}^{*}dog(x) \wedge \textit{barking-outside-my-window}(x))]$
$= \exists x[x \leq \textsc{dog} \wedge \textit{barking-outside-my-window}(x)]$

In prose, there is some individual specimen of DOG that is barking outside my window.

3.2.2 From kinds to subkinds

The next step to arrive at the desired *ad hoc* subkind interpretations involves a mapping from kinds to subkinds. There are a number of mappings in the literature between kinds and subkinds (e.g. Krifka et al. 1995, Wilkinson 1995, Zamparelli 1998), usually carried out by an operator, whose meaning is generally taken to be very similar to the noun *kind* in expressions like *kind of dog*. In accordance to the discussion above, however, we need a mapping that will partition kinds, not just any subkind extracting operation.

From the discussion in §3.1.1 we know what those conditions are. We can now simply define a partition function that meets these two criteria (cf. Gillon 1987, Schwarzschild 1996, Chierchia 2010 a.o. on plurals.) A partition of a kind K is a set of subsets of $^{\cup}K$ that covers $^{\cup}K$ and whose members do not share any instantiating individuals.

(28) **Partition function**
A partition function $\prod$ is a $\langle k, kt\rangle$ function such that for any kind K, $\prod(K)$ meets two conditions:

a. *Cover*
$\forall x_o[x_o \leq K \rightarrow \exists y_k \in \prod(K)[x_o \leq y_k]]$

b. *No overlap*
$\forall x_o[\exists y_k \in \prod(K)[x_o \leq y_k] \rightarrow \neg\exists z_k \in \prod(K)[y_k \neq z_k \wedge x_o \leq z_k]]$

As an illustration, consider the case of K = DOG, where we partition the DOG-kind taxonomically (i.e. $\prod(\textsc{dog}) = \{\textsc{collie}, \textsc{pug}, \textsc{greyhound}, \textsc{beagle}, \ldots\}$). Then condition (a) states that if x_o is an instance of the kind DOG, there is some subkind y_k in the set of subkinds $\prod(\textsc{dog})$ that x_o is also an instance of. This condition makes sure that all particular dogs belong to some subkind, to some breed in this case. In turn, condition (b) states that if x_o is an instance of the

subkind y_k, there will be no additional subkind z_k in $\prod(\textsc{dog})$ such that x_o also realizes. This is reflective of the fact that, if Fido is a beagle, he cannot be any other breed. More generally, the function ensures that if we partition the dog-kinds by breed, all border-collies will be in the same cell of the partition, and, say watch-dog border-collies will not be able to occupy their own–despite being a subkind of dogs as well in the actual world.

We can now use the partition function in (28) to provide a compositional account of *ad hoc* kind-referring terms. First, a kind must be partitioned into a set of individual correlates of its subkinds. We can do this by defining a kind-to-subkind operator that employs the partition function (cf. Zamparelli 1998). Call this operator κ.

(29) $[\![\kappa]\!] = \lambda x_k \,.\, \lambda y_k \,.\, \prod(x_k)(y_k)$

From a semantic standpoint, we can think of κ as doing covertly the task that the noun *kind* does overtly. It targets a kind x_k and returns a set of kind-individuals that partitions x_k. The function returns the set of (individual correlates of) subkinds that are in the partition.

(30) $[\![\kappa]\!]([\![\textsc{dog}]\!]) = \lambda y_k \,.\, \prod(\textsc{dog})(y_k) = \{\textsc{greyhound}, \textsc{border collie}, \textsc{beagle}, \ldots\}$

In this case, we have partitioned the domain of DOG subkinds according to their taxonomy, making sure on the way that no one dog belongs to two separate kinds. So far we have successfully reproduced Carlson's (1977b) results.

Let us look into simple *ad hoc* cases with anaphoric demonstratives. Assume a semantics for the demonstrative *that* where it can combine with sets of kind individuals, as in (31a) below. Then, the result of combining *that* with (30) delivers exactly the semantics we would like for an expression like *that kind of dog*: the contextually relevant subkind of dog x_k of which the object that $that_i$ is anaphorically referring to is an instance of. These are good news, for *that dog* and *that kind of dog*, as kind-referring expressions, can be used interchangeably in the right contexts.

(31) a. $[\![\text{that}_i]\!] = \lambda G_{\langle kt\rangle} \,.\, \iota x_k \,.\, G(x_k) \wedge \ that_i \leq x_k$ [Scontras 2017, 182]

b. $[\![\text{that}]\!]([\![(30)]\!]) = \iota x_k \,.\, (\lambda y_k \,.\, \prod(\textsc{dog})(y_k))(x_k) \wedge \ that_i \leq x_k$
$= \iota x_k \,.\, \prod(\textsc{dog})(x_k) \wedge \ that_i \leq x_k$

Notice that we have taken a leap here in (31). When we use the kind-referring terms *the dog* or *dogs*, we usually do so to refer to their taxonomic subspecies. But we are not limited to talk about dog breeds when we talk about dog subkinds. So, what forces us to pick taxonomic kinds? Nothing does; all κ requires is that the DOG-domain be partitioned. Then, it is a matter of the context how we partition the domain; sometimes we may be talking about breeds of dog, others about their role, sometimes perhaps about their hair color, and so on. This option comes about more clearly when we compare the terms *the dog* and *dogs* with *that dog*. Unlike the former, the latter are useful to refer to subkinds of dogs whose regular behavior amounts to whatever properties are supported in the context. These aspects of the meaning of kind-

referring expressions are all captured by (30)/(31b).

We have not quite achieved our goal of accounting for *ad hoc* kind reference, however. Resolving the referent of *that (kind of) dog* crucially depends on the presence of the demonstrative pronoun, as the ungrammaticality of the corresponding sentence with the definite article shows.

(32) a. That kind of dog is dangerous.

b. *The kind of dog is dangerous.

Only the variant in (32a) is able to resolve its referent. I suggested why earlier: two pieces of information are required in order to form an *ad hoc* kind in real time: (*i*) a semantic sortal– something to be a kind of–, and (*ii*) some means to identify what the relevant subkind is, i.e. to identify its sufficiently regular behavior. In the two cases in (32) the semantic sortal is provided by the kind-referring noun *dog*, but only (32a) provides a means to identify the relevant properties of the dogs that are to be recognized as dog-subkinds; in this case it does so by anaphorically referring to it. The variant in (32b) lacks this second piece of information and reference to a kind fails.

A similar state of affairs holds in the absence of the noun *kind*. When no natural kind nor an antecedent for the intended subkind is available, we can use *the NP Rel Clause* constructions to refer to *ad hoc* kinds. This is because the relative clause itself can express a regularity that characterizes the kind in question, thus aiding in kind reference resolution. With kind-referring terms involving the noun *kind*, the role of the relative clause is obvious. But given our analysis of the κ-operator, the role of the relative clause in *ad hoc* kind reference without the noun *kind* should follow analogously.

In order to capture this difference formally we can think of the relative clause as a means to further narrow the kind-referring potential of kind-referring NPs. It is in this respect that appealing to partitions becomes specially useful. We can easily modify κ so that it makes reference to an additional argument, a predicate P, and states a new condition whereby objects in the intersection of P and the property correlate of the kind K all live in the same cell of some partition of K. This can be done as follows. Consider first a revised version of κ, κ+.[6]

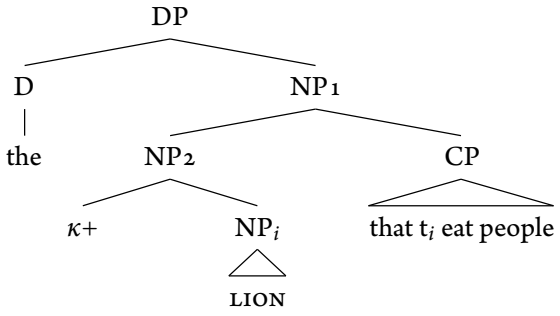
6 It is clear that besides the second property-argument slot for κ+, κ and κ+ do identical things. So one might wonder whether both are in fact necessary. At present, I remain agnostic about the relationship between the two operators and the possibility of a single, unified mapping, but I would like to spell out one possible approach to unification. Rather than having two mappings κ and κ+, we could simply propose the existence of a single mapping in a structure of the form [the κ+(NP) C_i], where C_i is simply some salient set of individuals that may be overtly or contextually supplied (cf. quantifier domain restriction). In the case of ordinary subkind expressions, C_i would be resolved to some "default", yielding a taxonomic interpretation; in the case of demonstratives, the contextually relevant set of entities would be co-indexed with the demonstrative, [that$_i$ κ+(NP) C_i], and thus limited to some entity that is currently being demonstrated. The cases of *ad hoc* kind referring expressions discussed in this paper would work as usual. Thus, all three cases involve modification/restriction, but the modifier is overt only in the case of one. While plausible, the challenge for such an account is the unavailability or at least highly limited availability of contextual restrictions in cases like (i) below:

(33) $[\![\kappa+]\!] = \lambda x_k \,.\, \lambda P_{\langle et\rangle} \,.\, \lambda y_k \,.\, \prod(x_y)(y_k) \wedge \forall z_o[z_o \leq x_k \wedge P(z_o) \rightarrow z_o \leq y_k]$

After applying to an individual kind x_k and a property P of individuals, $\kappa+$ returns the subkinds that include objects whose realizations are both instances of x_k and members of P. The task of P, the relative clause, is to provide information about the regular behavior that we must impute to the subkind in question. This is achieved by letting the relative clause do its usual job and interpreting it intersectively.

Let us work out a concrete example, *the lions that eat people*, from (21b). The term *lions that eat people* refers to a kind, but not to a natural or well-established one, so this is a task for $\kappa+$. For concreteness, assume a syntactic structure along the following lines.

(34)



By the time $\kappa+$ gets to enter into the derivation, the NP already denotes a kind.[7]

(35) a. $[\![\text{NP}_2]\!] = [\![\kappa+]\!]([\![\textsc{lion}]\!])$
$= \lambda P_{\langle et\rangle} \,.\, \lambda y_k \,.\, \prod(\textsc{lion})(y_k) \wedge \forall z_o[z_o \leq \textsc{lion} \wedge P(z_o) \rightarrow z_o \leq y_k]$

b. $[\![\text{NP}_1]\!] = \lambda y_k \,.\, \prod(\textsc{lion})(y_k) \wedge \forall z_o[z_o \leq \textsc{lion} \wedge \textit{eat-people}(z_o) \rightarrow z_o \leq y_k]$

The last line above returns a set of subkinds of the LION-kind that partitions the domain of lions and where the all the object-level lions of which P holds constitute an instance of one such kind. This is still too weak a meaning. But now the definite article can simply contribute an ι-operator: $[\![\textit{the } P]\!]$ = the contextually salient largest member of P, if there is one, else undefined. The article applies to the set of subkinds of lions denoted by NP 1 and returns the single subkind

(i) The rabies vaccine is now ineffective because of a mutation that the virus has undergone. So one must be very careful not to get bit by potentially rabies-carrying animals.
a. These days, the dogs that bite humans are especially dangerous.
b. # These days, the dogs are especially dangerous.

All in all, it is a good desideratum to do without one of the operators. Much work remains to be done, however, and I leave this for future investigations.

7 There a number of ways of doing this; for discussion see Carlson (1977b), Zamparelli (1998), Dayal (2004), Kratzer (2005), Borer (2005) a.o. Bear in mind however that different options entail different views of how nouns come to denote kinds. At any rate, this is a simplifying assumption, and nothing about how *ad hoc* kind-referring terms are derived hinges on this decision.

of which all the people-eating lions are an instance, i.e. individual correlate of the property *be a people-eating lion*.

(36) $\iota y_k . \prod(\textsc{lion})(y_k) \wedge \forall z_o[z_o \leq \textsc{lion} \wedge \textit{eat-people}(z_o) \rightarrow z_o \leq y_k]$
$= {}^{\cap}(\lambda z . {}^{*}\textit{lion}(z) \wedge \textit{eat people}(z))$

As a consequence, non-people-eating lions and lions that eat other things besides people will have to live in other cells of the partition.[8] It follows, then, that the cells in the partition cannot contain taxonomic subkinds anymore, since no partition of lions in terms of their subspecies will contain the *ad hoc* subkind of lions that eat people in one its cells. Thus, as desired, this method of referencing *ad hoc* subkinds overrides any other natural ways of picking the relevant subkinds (e.g. taxonomic properties, etc.).

The most likely way to complete the rest of the partition is to find a suitable equivalence relation that groups all people-eating lions in the same cell. An equivalence relation *eat the same as* might do. With this equivalence relation we may obtain a partition of the LION-kind like the following.

(37) $= \{\textsc{lions that eat people, lions that eat zebras, lions that eat carrion} \ldots\}$

What matters most is that the modifier, the relative clause in this case, is informing us about what one of the subkinds must look like.

The resulting DP can serve as an argument to kind-level predicates in the usual way. Alternatively, it can serve as non-kind-selecting predicates via Derived Kind Predication (see (26) above): a sentence like (39a) asserts the existence of an instantiation of the *ad hoc* eating-people-lion-kind, and that you like (some of) those instantiations.

(38) a. The lions that eat people are widespread.

b. $\textit{widespread}({}^{\cap}(\lambda z . {}^{*}\textit{lion}(z) \wedge \textit{eat people}(z)))$

(39) a. You like the lions that eat people.

b. $[\![(39a)]\!] = \exists y[{}^{\cup}({}^{\cap}\lambda z . {}^{*}\textit{lion}(z) \wedge \textit{eat-people}(z))(y) \wedge \textit{like}(y)(\textit{you})]$
$= \exists y[y \leq \textsc{lion} \wedge \textit{eat-people}(y) \wedge \textit{like}(\textit{you}, y)]$

Notice that, practically speaking, (39a) may be interpreted in a number of ways. This is because the semantics of $\kappa+$ only forces us to find a partition of lions where the lions that eat people live in one cell, but it does not force us to talk about the fact that these lions eat people. As with ordinary kind predication, there might be a number of reasons to refer to a kind. Thus, the traits of the lions that you like in (39a) need not be determined by the relative clause. For instance, it could be that lions that eat people have a number of associated characteristics (e.g.

8 As mentioned above, in order to build the partition properly the relevant description should be explicit enough to avoid overlap. Thus, we should have {LIONS THAT EAT ONLY PEOPLE, LIONS THAT EAT ONLY ZEBRAS, ...}.

they are faster, smarter, scheming, etc.) that you like, despite the fact that you are not fond of their habit to eat people. In such case, (39a) is true and felicitous, an interpretation that is captured by (39b).

3.3 *The distribution of* ad hoc *kind referring terms*

The analysis of *ad hoc* kind referring terms presented here shares many insights with what Umbach and Gust (2014) suggest for similarity demonstratives, if not in implementation at least in spirit. Similarity demonstratives are a particular breed of demonstratives that deictically or anaphorically express similarity to some target property, such as English *such*, German *so*, among others (also discussed extensively by Anderson and Morzycki 2015). Umbach and Gust (2014) define similarity in terms of indistinguishability with respect to a given set of relevant properties, where the demonstrative itself denotes a similarity relation. Crucially, the similarity relation is implemented in the semantic model as an equivalence relation, where the task of determining the domain the similarity is left to the context.[9] We thus have the same ingredients that I proposed above to account for *ad hoc* kind referring expressions: an equivalence relation that partitions the domain but whose sign is left unspecified, and information about a member of one of the cells in the resulting partition: the referent of the relative clause in our case, the object that the free variable x_{target} resolves to in their case. This convergence at the level of analysis seems promising.

Like *ad hoc* kind referring terms, similarity demonstratives may also refer to *ad hoc* kinds. Consider first the case of ordinary demonstratives (all examples in this section are taken from their paper):

(40) a. Dieses Auto will Anna haben. 'Anna wants to have this car.'

b. Diesen Tisch will Anna haben. 'Anna wants to have this table.'

While *dieses Auto* in (40a) readily allows for both individual-level as well as kind-level interpretations, out of the blue *diesen Tisch* in (40b) only has an individual-level interpretation. It would require a specific context, such uttering (40b) while shopping in furniture store, where table subkinds are conventional, to make the kind interpretation available. Similarity demonstratives are able to override this limitation. The sentences in (41), in a context where the speaker is pointing to a car or a table, express that what Anna wants to have is a car/table of the same kind as the one she is pointing at.

9 The denotation of the German demonstrative *so* that they propose for adnominal uses such as those in (41) is the following: $[\![\text{so}]\!] = \lambda D_{\langle\langle et\rangle,\langle et,t\rangle\rangle} . \lambda P_{\langle et\rangle} . D(\lambda x . sim(x, x_{target}, F) \wedge P(x))$, where x_{target} and F are free variables resolved in the context, x_{target} by picking by the target of the deictic gesture and F by determining the relevant aspects of similarity between the two objects.

(41) a. So ein Auto will Anna haben. 'Anna wants to have such a car.'

b. So einen Tisch will Anna haben. 'Anna wants to have such a table.'

Thus, just like with the *ad hoc* kind referring terms discussed earlier, similarity demonstratives have the capacity to take a kind that is not well-established, such as table-kinds, and build an *ad hoc* kind referring term out of the blue. This ability does not hold across all contexts, however.[10] Certain similarity demonstratives are never able to create a suitable *ad hoc* kind even when it is obvious what the relevant similarity relation should be. The authors provide the following example:

(42) a. Guck mal, das Auto da drüben hat einen Strafzettel.
'Look, the car over there has a parking ticket.'

b. ??Auf der anderen Straßenseite steht auch so ein Auto.
'There is such a car on the other side of the street, too.'

Even in the context of (42a), the demonstrative *so* in (42b) fails to retrieve a relevant similarity relation. The authors explain this disparity by limiting the properties that may make good *ad hoc* kinds to those properties that we ascribe to entities by virtue of them being the kind of things they are; they call these "criterial dimensions" (of similarity).[11] For instance, cars may have five doors by virtue of being cars. Correspondingly, building *ad hoc* kinds with similarity demonstratives is possible.

(43) Annas Auto ist so wie das da, weil es auch ein 5-Türer ist.
'Anna's car is like this one because it has also 5 doors.'

But, so the argument goes, because cars don't have parking tickets by virtue of being cars, the demonstrative in (42b) fails to build its own *ad hoc* kind.

It seems that this is where the parallels between similarity demonstratives and the *ad hoc* kind referring terms discussed here breaks down. The restriction to "by-virtue-of"properties does not apply to *ad hoc* kind referring terms in the same way. For one, notice that lions have manes by virtue of being lions, but they do not eat people by virtue of being lions. Similarly, dogs have four legs by virtue of being dogs, but they do not bite people by virtue of being dogs; etc. And yet we have no difficulty to construct such *ad hoc* kinds by using relative clauses. It seems, then, that the grammar allows at least for two closely related but ultimately different ways of constructing *ad hoc* kinds: those properties prominent enough may be picked up by similarity demonstratives, those properties that may be less familiar may not. At an intuitive

10 I am grateful to an anonymous reviewer who brought my attention to this fact.

11 The psychological underpinnings of this restriction are discussed in Prasada and Dillingham (2006). Anderson and Morzycki (2015) also notice the same restriction, which leads them to acknowledge the existence of "distinguished properties" that demonstratives have access to.

level it is not to surprising that similarity demonstratives have a narrower distribution, since the features of the similarity relation can only be determined by resolving a free variable in the context. In certain circumstances, pointing to an object may not be as effective a means to establish the required relevant property as restricting the domain of the kind with a relative clause. The similarities between the two constructions, at a formal level, are nevertheless striking, and call for a further examination of their relationship.[12]

3.4 Interim summary

Making reference to kinds requires structuring the domain in a certain way. I have argued that one way of capturing this requirement is by partitioning the domain, which accounts for Carlson's (1977b) disjointness condition. How the domain is partitioned, however, is left unspecified. Thus, interpreting a kind-referring term amounts to finding a suitable equivalence relation that groups all the instances of the kind in question in a single cell of the partition. We have seen how the process works in two cases. With ordinary kind-referring terms, this lack of specificity is resolved by context alone. This explains why we resort to regularities usually found in nature or previously–although tacitly–agreed upon by speakers, such as dog-roles might be. In cases of *ad hoc* reference, the unspecificity must also be resolved by appealing to contextual information. In the case of anaphoric kind-referring terms, the referent is resolved by finding a suitable antecedent. In contrast, *ad hoc* kind-referring terms of the form *the NP Relative Clause* are able to introduce their own referents in the discourse. I have argued that these expressions succeed in doing so because, by modifying the kind-referring NP, the relative clause provides an extra piece of information about how to partition the domain: it explicitly mentions a property that members of one of the cells in the partition must have. With this auxiliary information we have access to the rest of the partition (at least to one of many) without prior agreement about what the other subkinds might be.

The difference between the two types of subkind referring expressions is captured via two kind-to-subkind mappings, κ and $\kappa+$. The necessity for $\kappa+$ is signaled by the fact that, as discussed in §1, *ad hoc* subkind interpretations with definite plurals are generally modified by a relative clause: *the dogs are dangerous* cannot refer to a subkind of dogs, unlike *that dog/the dogs that bite people are dangerous*.[13] This goes in line with the earlier observation that definite plurals require two pieces of information to form good *ad hoc* kind referring expressions: (*i*) a

12 An anonymous reviewer points out that there may be other restrictions on *ad hoc* kind referring terms:

(i) You like the lions that eat {people / ?pigeons / ??flowers / ???aple pie}

This may be so, but it seems that the reason for the increase in the oddness of these sentences is well grounded. Nothing prevents us from constructing these *ad hoc* kinds, certainly not the grammar. But in the analysis defended here, the *ad hoc* kind referring expression depends entirely on the plausibility of there being an equivalence relation that sets e.g. apple-pie-eating-lions in one cell of the partition. If there were no such lions, there would be no partition, and thus a decrease in the plausibility of encountering them comes with a decrease in felicity. In fact, since the kind-level object in object position is interpreted via DKP–which brings in existential quantification over instances of the relevant kind–the existential commitment to apple-pie-eating-lions is asserted.

semantic sortal and (*ii*) the means to identify what the relevant subkind is, which are provided by the NP and the relative clause respectively. Instead, demonstratives require κ because no property is explicitly provided to identify the relevant kind (other than the gesture itself). This speaks against a reduction of κ to $\kappa+$ where (*ii*), and it also rules out an alternative parse where κ applies to an NP that has already been modified by a relative clause, [the [κ [NP RC]]], since the relative clause would no longer be required to denote *ad hoc* kinds.

4 Amount and Degree Relatives

An analysis of *ad hoc* reference in terms of partitions has additional benefits. Carlson (1977a,b) originally observed that there seems to be a connection between kind and amount interpretations: he noted that amount relatives in English can also have kind interpretations. This observation has gone somewhat unnoticed however, and the literature on kind and amount interpretations of relative clauses has followed separate paths. From a historical perspective, analyses of amount interpretations have overwhelmingly resorted to degree semantics, thereby obscuring the connection–if only descriptive–to kind interpretations. In this section I return to Carlson's observation and take it one step further: I argue that the reason why relative clauses with amount interpretations always allow kind readings is because amount interpretations *are* a form of kind interpretation. Earlier I proposed a generalization that captures this hypothesis, which I repeat below.

(6) The AMOUNT $\subseteq$ KIND generalization:
Amount interpretations of relative clauses are a form of kind interpretation.

In the remainder of the paper I argue that the analysis of *ad hoc* kind reference laid out in §3 can parsimoniously account for amount (and degree) interpretations of ordinary relative clauses as well. The idea in a nutshell is as follows. Since the equivalence relations that partition the domain when referring to kinds are ultimately set by context, there is no reason not to pick one based on quantities or amounts. Just like equivalence relations *be the same kind as* or *be the same role as* can be eligible in the context, so can *be as tall as*, *be as many as*, etc. The only additional assumption that is required is that degrees are definable in terms of equivalence classes, a proposal first put forth by Cresswell (1976).

The form of the argument that I present is as follows. First I provide a short discussion of the relevant semantic properties of relative clauses with amount interpretations that make them stand out from ordinary restrictive relative clauses. I show that these properties receive a straightforward explanation if these constructions are *ad hoc* kind-referring terms. This accounts for the formal aspect of the discussion. Then, in the next section, I compare this result to degree-based approaches to amount interpretations, and I show that the analysis presented here, besides being more parsimonious, is able to capture a wider range of empirical phenom-

13 But see examples (65)/(66) in §5.1 and the discussion in §6.

ena. Finally, I provide a number of arguments showing that the similarities between amount and kind interpretations are real, and that the analysis provided above is not a simple artifact of the formal tools employed to analyze *ad hoc* referring terms.

4.1 A primer on Amount Relatives

Amount Relatives are relative clause constructions that refer to amounts rather than individuals.[14] Consider the following examples (from Heim 1987 and Grosu and Landman 1998):

(44) a. It will take us the rest of our lives to drink the champagne they spilled that evening.

b. We lost the battle because we didn't have the soldiers that the Imperial Army had.

We saw example (44a) before: on its most sensible interpretation it refers to the *amount* of champagne that they spilled that evening, not to the actual champagne. Similarly, (44b) attributes losing the battle to having a smaller *amount of* soldiers, not to the truism that we did not have the same particular soldiers the Imperial Army did.

Pre-theoretically, there are three main semantic properties of amount interpretations that set them apart from ordinary object-referring interpretations. The first and most obvious is that they refer to amounts, and not objects. This observation, albeit obvious, is far from innocent: it comes with the non-trivial consequence that, in spite of being of the form *the NP*, amount interpretations do not refer to that NP. The flip-side of this property is that the NPs *champagne/soldiers* in (44) cannot be interpreted as definites, but as indefinites. For instance, in (44a) there is no single individual object-level champagne that would take us long to drink; in fact, any champagne in the relevant amount suffices. This behavior of the head of the relative clause is puzzling because, again, the head noun, is a definite NP on the surface. The last distinguishing property of amount interpretations is that they always involve a comparison of two amounts of the same stuff. To appreciate this requirement better, consider first a classifier relative clause with an overt noun *amount*.

(45) It would take us years to drink the amount of champagne that you drank of wine.

What (45) shows is that relative clauses headed by the noun *amount* allow the comparison of two different sets/instances of stuff; in this case between an amount of champagne and amount

14 A note on terminology: When Carlson (1977b) coined the term, he referred to the *that*-phrase as being an *amount relative*, not the full DP. Thus, amount relatives in Carlson's (1977a) classification include also cases like the following:

(i) a. Marv put everything that he could in his pocket. [Carlson 1977a, 527, ex. 17]

b. I took with me the books that there were on the table. [adapted from Grosu and Landman 1998]

The example in (i) involves a relative clause with Antecedent Contained Deletion and (ii) is a case of relativization out of an existential clause. In his original work, Carlson (1977a) treated this type of examples of a par with (44), but there have been dissenting voices since (see Herdan 2008 and McNally 2008). Thus I will limit myself to constructions like (44), of the form *the NP Relative Clause*.

of wine. The same, however, is not possible with ordinary looking relative clauses.

(46) *It would take us years to drink the champagne that you drank wine.

Summing up, any theory that aims at accounting for amount interpretations of relative clauses should capture these three empirical facts. I summarize them below.

(47) **Desiderata for amount interpretations of relative clauses**

a. *Definiteness*:
Amount interpretations refer to a definite amount, not a definite individual.

b. *Indefiniteness*:
The head of the relative clause is interpreted as an indefinite.

c. *Identity*:
Amount interpretations require a comparison of two amounts of the same stuff.

In §4.3 I turn to show how these properties can be captured by the analysis of *ad hoc* kind referring terms laid out before in §3.

4.2 *Degree-based accounts and missing generalizations*

Historically, it has been assumed that degree semantics–in its traditional form–should be invoked in order to derive amount interpretations of relative clauses. Picking up on Carlson's idea that the work of extracting an amount should be done at the CP level, the received view has it that the embedded CP is a degree expression, most commonly a set of degrees (Heim 1987, von Fintel 1999, Grosu and Landman 1998, 2017, Herdan 2008, Meier 2015, a.o.). This is usually achieved with the aid of some null measuring predicate MANY/MUCH, like the ones familiar form the literature on comparatives and measure phrases:

(48) a. $[_{\text{DP}}$ the $[_{\text{NP}}$ champagne $]_j$ $[_{\text{CP}}$ $[_{\text{NP}}$ *d*-MUCH t_j $]_i$ that they spilled t_i $]]]$

b. $[\![\text{CP}]\!] = \lambda d\,.\,\exists x[\mathit{champagne}(x) \wedge \mathit{they\text{-}spilled}(x) \wedge \mu_{\text{MUCH}}(x) = d]\big)$

Obviously, a property of degrees cannot be intersected with a sortally-mismatched property of individuals, and the question arises: how does the CP modify an NP? More generally, on the face of the semantic properties described in (47), should amount relatives be treated as denoting individuals (type *e*) or do they denote degrees (type *d*)? A plausible logical form of *e*-denoting amount relatives, loosely based on von Fintel's (1999) matching structure, could look as follows:

(49) $[_{\text{DP}}$ the $[_{\text{NP1}}$ *d*-MUCH champagne $]$ $[_{\text{CP}}[_{\text{NP2}}$ *d*-MUCH champagne $]]_j$ $[_{\text{CP}}$that … t_j $]]]]$

(50) $[\![\text{DP}]\!] = \iota y\,.\,champagne(y)\ \wedge\ |y|\ = \textsc{max}\big(\lambda d\,.\,\exists x[champagne(x)\ \wedge\ |x| = d\ \wedge \ldots]\big)$

The problem is, of course, that the definite deteminer should not be interpreted, for amount interpretations are not about individual-level objects. Instead, we could try ascribing the full DP a *d*-type denotation, this time from a logical form based on Grosu and Landman's (1998) raising structure:

(51) $[_{\text{DP}}$ the $[_{\text{NP}}$ champagne $]_j$ $[_{\text{CP}}$ $[_{\text{NP}}$ *d*-MUCH t_j $]_i$ that we spilled t_i $]]]$

(52) $[\![\text{DP}]\!] = \textsc{max}\big(\lambda d\,.\,\exists x[champagne(x)\ \wedge\ they\text{-}spilled\text{-}last\text{-}night(x)\ \wedge |x| = d]\big)$

In this case the problem is that this definite degree must then combine with a predicate, *drink*, that only takes individual-level objects: we drink liquids such as champagne, not degrees.

However we choose to circumvent these issues (various implementations are offered in Grosu and Landman 1998, 2017, von Fintel 1999, Herdan 2008, Meier 2015, Mendia 2017, a.o.), the main drawback with degree-based accounts is one of missing generalizations. Two generalizations in particular remain mysterious. First, amount and kind interpretations share the key semantic properties that make amount interpretations of relative clauses stand out and behave unlike intersective relative clauses. Second, whenever an amount interpretation is available for a relative clause construction, a kind interpretation is available as well. If, as suggested here, amount interpretations of relative clauses are in fact *ad hoc* kind interpretations, the two generalizations follow naturally. In what follows, §4.3 addresses how to understand amounts *qua* kinds without anymore assumptions than those discussed in §3, and §4.4 shows how the results circument the issues mentioned here while complying with the semantic criteria laid out in (47).

4.3 What amounts and kinds have in common

Having recast Carlson's (1977b) disjointness condition in terms of partitions makes the connection between *ad hoc* kinds and amount interpretations maximally salient. As it was argued above, reference to kinds must be mediated by an equivalence relation that induces a partition on the domain. How this equivalence relation is determined is context dependent; as a consequence, part of the task when interpreting an *ad hoc* kind-referring expression involves retrieving this equivalence relation from the context.

Following Cresswell (1976), Klein (1980) and many others, degrees can be understood as equivalence classes of ordinary objects. That is, the degree to which I am tall can be defined by the set of all things that are the same height as me, an amount of champagne as the set of all portions of liquid of equal volume, etc. Because interpreting *ad hoc* kinds involves figuring out what the equivalence relations is, and because some equivalence relations can serve to define amounts–and degrees, more generally–, there is no reason why *ad hoc* kinds should not make reference to portions of equal amounts, just like they refer to other sets of entities. Coming

back to the example in (44a) above, we could say that the equivalence relation *be the same kind as* would give us a partition of champagne according to their kind (e.g. *blanc de noirs, blanc de blancs, rosé champagne*…); the equivalence relation *be as sweet as* would partition the different types of champagne in terms of their sweetness (*extra brut, brut, extra dry*…), whereas an equivalence relation *be as much as* would partition the denotation of champagne in different amounts (*1L, 2L, 3L*…or perhaps *1 bottle, 2 bottles, 3 bottles*…).

In what follows I elaborate on the details of this account.

4.3.1 Degrees as equivalence classes

The agenda of reducing degrees to existing objects that are better understood and less abstract goes back to Cresswell (1976), but see also Klein (1980, 1991), Hoeksema (1983), Rullmann (1995) and more recently Bale (2006, 2008). The basic tenet in Cresswell (1976) is to view degrees as equivalence classes of individuals.[15]

I illustrate the main idea with an adjective A. Associated with any gradable predicate (an adjective, adverb, verb, etc.) there is a two-place relation $\succeq_A$, and a set D_A. The set D_A is a subset of the universe of discourse containing all and only those objects of which the adjective can be sensibly predicated. This is just a lexical requirement to make sure that a set like D_{tall} contains people, mountains, etc., but not ideas or colors, since the latter cannot be sensibly attributed a height. The relation $\succeq_A$ is reflective of our conceptual ability to determine, from any two individuals, which has more of a certain quality than another. From this intuition, Cresswell (1976) suggested to define $\succeq_A$ as follows:

(53) $\langle D_{tall},\ \{\langle x, y\rangle\ :\ x, y \in D_{tall}$ and x is as tall as $y\}\rangle$

The relation $\succeq_A$ has certain properties. First, it is reflexive. Given any one individual x, x is as tall as x. Second, it is transitive. For any three individuals x, y and z, if x is as tall as y and y is as tall as z, then x as tall as z. And third, the relation is connected. If any individuals x and y are in D_{tall}, then either $\langle x, y\rangle$ or $\langle y, x\rangle$ is in the relation. The resulting relation is weaker than a partition, it only fits the criteria for being a *pre-order* (or *connected quasi-order*).

One of Cresswell's (1976) contributions was to show that it is possible to build a scale from an underlying pre-order. The process requires two basic steps–although only the first one concerns us here. First, one must partition the domain of individuals in the pre-order. Then, the resulting equivalence classes are ordered with respect to each other by a relation that

15 In the rest of the paper I make use of this notion, but in a slightly different way from Cresswell's (1976): rather than taking degrees to be equivalence classes, it suffices to assume that it is possible, for any one degree d, to determine the set A of things of which d holds. Similarly, any plural individual x will have a natural corresponding degree d stating its cardinality. This is reminiscent of the mappings existing between kinds and properties (e.g. Chierchia 1998). Thus, this should not be understood as radically switching conceptions of degrees; there is still room for simplex degrees in the ontology.

is congruent with the underlying pre-order.[16] In this case, we can easily define an equivalence relation from $\succeq_A$ as follows.

(54) $x \simeq_A y \leftrightarrow x \succeq_A y \wedge y \succeq_A x$

Now we can partition a domain according to $\simeq_A$ as we did before. The degree of A-ness of an object x, say $deg_A(x)$ can be defined as the set of all objects that stand in the $\simeq_A$ relation to x:

(55) $deg_A(x) = \{y \in D_A : x \simeq_A y\}$

As a consequence, the degree to which Liz is tall, $deg_{tall}(Liz)$ can now be identified with the set of all objects that are exactly as tall as Liz. Proceeding alike for all the individuals in D_A we can get the set DEG_A, the set of all equivalence classes into which D_A is partitioned by $\simeq_A$. DEG_A is now a partition, since $\simeq_A$ is *reflexive*, *transitive* and *symmetric*.[17] In this view, each degree d corresponds to one of the cells in the partition DEG_A induced on the set D_A. For instance, in the case of DEG_{tall} (and a very reduced domain) we may have:[18]

(56) **Representation of DEG_{tall} as a partition**

$d_{5.8f}$:	John, Sue Liz
$d_{5.9f}$:	Mary, Al
d_{6f}:	Mike, Helen
$d_{6.1f}$:	Hilary

The process of establishing a partition from a plurality works exactly the same. We only have to be careful not to count each individual twice. We could not claim without further ado that a plurality $a \oplus b$ of two objects lives in the cell corresponding to pluralities of cardinality 2, because the same individuals a and b might team up with a third individual c to be part of a second cell in the partition, the one corresponding to pluralities of cardinality 3. This goes against the disjointness condition. The solution is to adopt a Link (1983) style approach to pluralities, whereby plural entities are just *sums* of individuals, not sets, as concrete as the individuals that serve to define them and of the same logical type. Plural morphology signals

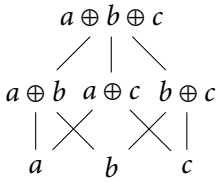
16 There a number of ways we can order equivalence classes. Rullmann (1995), following Klein (1991), provides a simple one. The relation $\succeq_A$ may induce a relation $\geq_A$ on the members of DEG_A such that $deg_A(x) \geq_A deg_A(y)$ *iff* $x \succeq_A y \wedge y \not\succeq_A x$. It can be shown that $\geq_A$ takes the equivalence classes in DEG_A and induces a linear (total) order–a relation that is reflexive, transitive, connected, and antisymmetric. For discussion and proofs, see Cresswell (1976), Klein (1991) and Bale (2006).

17 *Reflexivity*: $\forall d, d' \in DEG_A[d \simeq_A d']$. *Transitivity*: $\forall d, d', d'' \in DEG_A[[d \simeq_A d' \wedge d' \simeq_A d''] \rightarrow d \simeq_A d'']$. *Symmetry*: $\forall d, d' \in DEG_A[d \simeq_A d' \rightarrow d' \simeq_A d]$. By virtue of equivalence classes being disjoint sets, $\simeq_A$ is also *non-connected*).

18 Notice that the thresholds of the degrees should be overtly determined, so that there is no vagueness whatsoever as to where exactly every individual belongs in the partition. In the example above the cut-off point was the nearest inch, so the actual equivalence relation should read *be as tall as, to the nearest inch*. In real life, the relevant granularity should be picked up from the context. This includes the dimension as well, as amounts of champagne in (44a) could be measured in bottles as well.

the presence of a pluralization operation $*$ which generates all the individual sums of members of the extension of any 1-place predicate. This operation forms a complete join-semilattice with the bottom element removed in D that $*$ generates by operating over atoms. That is, D is closed under the join operation, and $a \oplus b$ is the "individual-sum" of a and b. This gives us the following structure on D:

(57) Denotation of ${}^*D$ where $D = \{a, b, c\}$:



Assuming that cardinalities are a special case of degrees, as it is common practice, we can create a partition DEG_{card} on D by the equivalence relation $\simeq_{card}$.

(58) a. $x \simeq_{card} y \leftrightarrow x \geq_{card} y \wedge y \geq_{card} x$

b. $deg_{card}(x) = \{y \in {}^*D : x \simeq_A y\}$

The result is a partition of the domain of plural individuals according to their cardinality.

(59) **Partition DEG_{card} on ${}^*D$:**

$a \oplus b \oplus c$
$a \oplus b, a \oplus c, b \oplus c$
a, b, c

The equivalence class $[a \oplus b]_{card}$ corresponds to all plural individuals of cardinality 2 in the domain, such that $[a \oplus b]_{card} = [a \oplus c]_{card} = [b \oplus c]_{card}$. Because plural individuals are individuals with full rights, we need not look into their composing parts. That is, a and b only belong to the bottom cell in (59); the fact that $a \oplus b$ is a member of a different cell is inconsequential in this respect.

4.3.2 Accounting for amount interpretations

Once we understand degrees in terms of equivalence classes, there is little more to do. We know that we can refer to a kind by directly mentioning its name, by anaphorically referring to it or, as in (44a), by constructing an *ad hoc* kind-referring term with the aid of a relative clause. Consider again (44a):

(44a) It will take us the rest of our lives to drink the champagne they spilled that evening.

In this example, *the champagne that they spilled that evening* can be understood as referring to an *ad hoc* kind of champagne. Suppose that the reason why it would take us long to drink it

again is because, being a very exclusive type of champagne, say a *prestige cuvée*, it is hard to find it. In such scenario we opt for a partition of the champagne kind into its different taxonomic subkinds, and we assume that the particular champagne they spilled lives in one of the cells, in this case the one containing instances of *prestige cuvée*:

(60) **Champagne partitioned by taxonomic kinds**

Prestige cuvée
Blanc de noirs
Blanc de blancs
Rosé Champagne

$\rightsquigarrow$ the champagne that they spilled was a *prestige cuvée*.

Each one of the cells above contains the individual instances of champagne that correspond to each kind. (In this respect, the table above is just a shortcut to the actual partition, whose members are always individuals, not kinds.) Carlson's (1977b) disjointness condition is met by resorting to an equivalence relation like *be the same type as*.

At this point, it is straightforward to extend the same reasoning to the classical examples of relative clauses with amount interpretations. Since we know that cardinalities, volumes, etc. can be defined in terms of equivalence classes, there is no reason why the required equivalence relation cannot be of the form *be as much as*. For instance, for the classical *champagne* example (44a), we could envision a partition like (61) (see fn. 18).

(61) **Champagne partitioned by volume**

...
d = 9L
d = 9.5L
d = 10L
...

$\rightsquigarrow$ the champagne that they spilled was d-much.

As long as it is supported in the context, any equivalence relation will do. For example, it could be that the reason why it would take us so long to drink champagne like the one they spilled is because it was much sweeter than usual, and we abhor sweet champagne. In that case, we can generate the relevant partition from an equivalence relation like *be as sweet as*.

(62) **Champagne partitioned by sweetness in gr. of sugar per litre**

...
d = 19gr
d = 20gr
d = 21gr
...

$\rightsquigarrow$ the champagne that they spilled was d-sweet.

To reiterate: ordinary kind reference must be mediated by a partition to ensure that the domain is covered without overlap. This partitioning is carried out by an equivalence relation

that is only contextually determined. In the case of *ad hoc* kind reference, the only condition that the equivalence relation must meet is that it assigns the denotation of the full modified NP (together with the relative clause or PP modifier) to a single cell in the partition. As long as this is observed, any equivalence relation might do. Thus, the only difference between (60), (61) and (62) above is that different equivalence relations are picked in different contexts. Nothing else is required.

4.4 *Assessment*

If the rationale and the analysis presented here are correct, amount interpretations of relative clauses are simply a case of *ad hoc* kind reference. Thus, the only analysis we need is one that derives *ad hoc* kind reference. From a purely semantic point of view, the analysis correctly derives the three properties of amount interpretations described in (47). To see how, consider again (39a), repeated below as well.

(47) **Desiderata for amount interpretations of relative clauses**

a. *Definiteness*:
Amount interpretations refer to a definite amount, not a definite individual.

b. *Indefiniteness*:
The head of the relative clause is interpreted as an indefinite.

c. *Identity*:
Amount interpretations require a comparison of two amounts of the same stuff.

(39a) You like the lions that eat people.

On one of its readings, (39a) refers to a kind. There could be a number of reasons why you like people eating lions: it could be that they are stronger, faster, smarter, etc. This is a case of *ad hoc* kind reference, because the referred kind goes beyond what we usually think of natural or well-established kinds of lions, and moreover it does so in real time–i.e. it is not anaphoric. No matter the reason chosen for justifying that lions that eat people belong to a kind, the resulting interpretation has the same properties of amount interpretations described in (47). First, the sentence does not refer to any one particular lion, despite being overtly of the form *the lions that*… . This is precisely the same condition of *indefiniteness* on the head of the relative clause described in (47). Similarly, the sentence refers to a definite kind of lion, the precise kind of lion that has the property of eating people. This is, again, fully parallel to the condition on *definiteness* described in (47). Finally, notice that we are not at liberty to choose what is the thing that you like; it must be lions.[19] This is the same *identity* restriction that we observed in (47) for amount interpretations.

19 This constraint is reminiscent of Zamparelli's (2002) discussion about the requirement to interpret a NP twice in constructions like *a coin of every kind*, since what the expressions means is obviously *a coin of every coin-kind*.

The conclusion to be drawn is clear: we should not take the facts in (47) to be the signature of amount interpretations alone. This state of affairs raises a question: are we still justified in treating the two interpretations as being fundamentally different? My answer is no. What amount and kind interpretations of relative clauses have in common is that they both arise as the result of an effort to find the sufficient regularity required to refer to a kind. Thus, we can generalize over these intuitions. Consider (44a) again, which has both kind and amount interpretations, paraphrased now as (63):

(44a) It would take us years to drink the champagne that they spilled that evening.

(63) [$_{\text{DP}}$ the champagne that they spilled that evening] $\leftrightsquigarrow$ champagne with property $\mathbb{P}$
[where "the champagne that they spilled that evening" is a realization of $\mathbb{P}$]

As we know, the property $\mathbb{P}$ can be anything that holds of the champagne they spilled that evening, a fact successfully accounted for by the resulting interpretation in (64).

(64) a. $\iota y_k . \prod(\textsc{champagne})(y_k) \wedge \forall z_o[z_o \leq \textsc{champagne} \wedge \textit{they-spilled}(z_o) \rightarrow z_o \leq y_k]$
$= {}^{\cap}(\lambda z . {}^{*}\textit{champagne}(z) \wedge \textit{they-spilled}(z))$

b. $[\![$drink the champagne that they spilled$]\!]$
$= \lambda x . \exists y[{}^{\cup}({}^{\cap}\lambda z . {}^{*}\textit{champagne}(z) \wedge \textit{they-spilled}(z))(y) \wedge \textit{drink}(x, y)]$
$= \lambda x . \exists y[y \leq \textsc{champagne} \wedge \textit{they-spilled}(y) \wedge \textit{drink}(x, y)]$

To summarize, the account of *ad hoc* referring expressions introduced in §3 is able to capture the semantic properties of relative clauses with amount interpretations. Only one extra assumptions is necessary, namely that degrees can be represented in as equivalence class, i.e. properties that hold of object-level individuals. Once this assumption is accepted, there is no way of stopping *ad hoc* referring terms from picking contextually salient equivalence relations that correspond to degrees. These results speak in favor of the AMOUNT $\subseteq$ KIND generalization introduced earlier.

(6) The AMOUNT $\subseteq$ KIND generalization:
Amount interpretations of relative clauses are a form of kind interpretation.

5 Amounts without degrees

Degree-based analyses of amount relatives make predict that, all else equal, they should behave on a par with *bona fide* degree constructions involving degree abstraction at the CP level, like comparatives and equatives. To my knowledge, whether this is the case is not a question that has been explicitly addressed in the literature. This is precisely the object of the rest of this section. The results of this closer examination have already been foreshadowed along the paper: if we take comparatives and equatives as the quintessential degree constructions involving a relative clause and degree abstraction at the CP level, amount interpretations of relative

clauses do not behave alike. The conclusion, then, is clear: amount interpretations like those discussed in the literature on amount relatives cannot rely on the degree machinery usually assumed for them. On the other hand, this state of affairs is not surprising if the ability of these constructions to refer to amounts is a side effect of *ad hoc* kind reference.

5.1 Lack of a relative clause

By now we know what the role of the relative clause is in *ad hoc* kind reference expressions: to restrict a kind-referring noun so that we can find a suitable equivalence relation that serves to induce the correct partition in the context. In this sense, we can think of the property denoted by the *that*-phrase as providing a "clue" by mentioning a property that all members of one of the cells in the partition must share. From these assumptions, two consequences follow: first, if all the relative clause is doing is providing this extra help to identify the relevant equivalence relation in the current context, we would expect other NP modifiers to be able to do the same job without affecting the availability of kind/amount interpretations. This is certainly the case: both kind and amount interpretations are possible with nouns modified by PPs instead of relative clauses.

(65) ***Amount/Kind* interpretations with PPs**

a. We lost the battle because we didn't have the soldiers of the Imperial Army.

b. We used to organize a soccer team, but we don't have the students in the department anymore.

For instance, the sentence (65b) might refer to the fact that in the department we do not have enough students to set up a team anymore, or it could be that the students we have are not willing to participate.

Second, given that the role of the modifier is merely auxiliary, the relative clause might be dropped altogether, provided that we have enough contextual support. This is also possible.

(66) ***Amount/Kind* interpretations with bare DPs**

a. We lost the battle because we didn't have the soldiers.

b. We used to organize a soccer team, but don't have the students anymore.

While the availability of kind interpretations might not come as a surprise in these cases, the presence of amount interpretations is puzzling from a perspective where they rely on the presence of degree-operators originated inside the relative clause.

5.2 Sub-deletion

The process known as sub-deletion is considered a hallmark of degree abstraction (Kennedy 1999; Lechner 2001, a.o.). For instance, comparatives and equatives all allow sub-deletion.

(67) a. I brought more bananas than you brought apples.

b. I brought as many bananas as you brought apples.

Classifier Relatives too differ from other pseudo-partitives and from *kind of* relatives in that they allow sub-deletion.

(68) a. I brought the { amount / quantity } of bananas that you brought of apples.

b. *I brought the pounds of bananas that you brought of apples.

c. *I brought the kind of water that you brought of stones.

In contrast, relative clauses with amount interpretations never allow sub-deletion.

(69) *It will take us the rest of our lives to drink the champagne that they spilled wine that evening.

The lack of sub-deletion properties of (69) points towards a fundamental difference in how the amount interpretations arise in (67) and (68a) on the one hand and amount interpretations such as (44a) on the other. Thus, there where we could expect similarities between degree-constructions, we find a stark contrast instead.

5.3 *Islands*

The last argument is the lack of island effects with relative clauses that permit an amount interpretation. There is a subset of syntactic islands, the so-called weak or sensitive islands, which only allow extraction of certain kind of grammatical expressions. It is more or less agreed that expressions ranging over individual entities are good extractees, as opposed to expressions ranging over other domains, like degrees, times, manners, etc., which often incur so-called island violations.

If relative clauses require degree abstraction to obtain amount interpretations, they should pattern together with other constructions that involve the same operation in showing weak-island sensitivity, much like comparatives, equatives and *how many* questions. By the same token, relative clauses with an amount interpretation should contrast with individual *who* questions, which involve abstraction over individuals, and are able to be extracted from weak islands. Below, I examine the behavior of *e*-denoting *vs.* *d*-denoting *wh*-words in weak-island contexts as a baseline, and compare this with the behavior of comparatives, equatives and relative clauses. Note, of course, that the arguments can only go through if the relative clauses retain the amount interpretation.[20]

20 The availability of amount interpretations seems to be subject to speaker variation. What is crucial for is that to the extent that a speaker readily accesses the amount reading, they find a contrast between the uncontroversial degree-constructions and amount relatives.

5.3.1 Negative islands

The interaction between degree operators and negative and other downward entailing operators was noted early on the works that pioneered degree semantics for the study of comparative constructions (see von Stechow 1984). An influential view popularized by Rullmann (1995) attributes the ill-formedness of the (70) examples below to the impossibility of maximalizing a set of degrees that contain a negative operator in its scope.

(70) a. *How many soldiers doesn't the Imperial Army have?

b. *We have more soldiers than the Imperial Army doesn't have.

c. *We have as many soldiers as the Imperial Army doesn't have.

In short, the issue is that the maximality operator, as commonly defined by means of a Russellian ι-operator, presupposes a maximal degree among all the degrees in the set that it ranges over. In the absence of such maximal degree, the expression is undefined, yielding ungrammaticality (in the sense of Gajewski 2002; see Abrusán 2014 and Rett 2015 for discussion). Thus, in the examples above, there is no maximal number of soldiers that the Imperial Army did not have, since presumably that number is infinite, and thus the result of the maximalization operation is undefined.

The ungrammaticality of the previous examples contrasts with the grammaticality of cases where the extractee lives in the domain of individuals, such as *which* and *what*.

(71) Which soldiers doesn't the Imperial Army have?

Now, if we look at relative clauses with amount interpretations, we observe that they pattern like (71) and unlike the examples in (70) above. Many speakers admit an amount reading of (72) without further ado: it amounts to saying that our soldiers exceeded in number those of the Imperial Army. (As expected, out of the blue, the kind interpretation of (72) is also available.)

(72) We won the battle because we had the soldiers that the Imperial Army didn't have.

Examples (73) and (74) make the same points, but with more naturalistic examples.

(73) Context: In a yearly food eating competition, contestants compete to eat the largest amount of hot-dogs.

a. I won the contest by eating the hot-dogs that you couldn't eat.

b. I broke the record by eating the hot-dogs that I couldn't eat last year.

(74) a. I drank in 30' the wine that Marv couldn't drink in one day.

b. I solved in 15' the chess problems that Marv solved in one hour.

5.3.2 Tenseless *wh*-islands

The case of tenseless *wh*-islands presents a similar contrast. First we observe that there is indeed a difference in acceptability between extracting an entity denoting element and a degree denoting element from a position embedded within a tenseless verbal phrase. (Some speakers might feel less of a contrast in this case because, while infinitival *wh*-islands are only weak islands in English, tensed *wh*-islands are strong islands.)

(75) You need to fight the Imperial Army…

a. *How many soldiers are you wondering whether to hire?

b. Which soldiers are you wondering whether to hire to fight the Imperial Army?

As before, other degree constructions pattern with (75a) as well.

(76) A. How did we win the battle against the Imperial Army?
B. While you were debating whether or not to increase the size of your army…

a. *We hired more soldiers than you were wondering whether to hire.

b. *We hired as many soldiers as you were wondering whether to hire.

In contrast with (75a) and (76), the relative clause in (77) is grammatical and felicitous under an amount interpretation, even though the head of the relative clause is extracted from a tenseless verb phrase. Consider, for instance, a situation where two generals are discussing how many soldiers they should hire to fight against the Imperial Army. While one of them is indecisive about hiring a certain number, the second one goes ahead and hires that many soldiers. In this case, (77) is true and felicitous.

(77) A. How did we win the battle against the Imperial Army?

b. While you were debating whether or not to increase the size of your army. we hired the soldiers that you were wondering whether to hire.

5.3.3 Factives

Presuppositional islands are induced by extracting material out of linguistic contexts that carry some presupposition. There are various types of presuppositional islands, I will only review factive verbs here; others include response stance verbs and factive nouns and adjectives. Generally speaking, it is assumed that movement of a *wh*-operator from under a factive predicate is bad if the gapped embedded clause denotes a unique element (see Szabolcsi and Zwarts 1993, Schwarz and Simonenko 2016 a.o.). This accounts for the observed difference between the following two questions:

(78) a. To whom do you regret having shown this letter?

b. *From whom do you regret having gotten this letter?

Factive islands are created by factive (negative) predicates like *regret*, as in (78) above (Szabolcsi and Zwarts 1993). Under a classical approach to degree questions (e.g. von Stechow 1984), a question like (79a) in interpreted as *For what degree* d *did John regret that he spilled* d-*much wine at the party?* In general, degree questions of the form $?d[\varphi_p(d)]$ where $\varphi_p(d)$ is an expression presupposing $p(d)$ are predicted to presuppose that $p(d)$ holds to the maximal degree on the scale required by the gradable predicate, which is undefined in the case of quantity predicates and open scale adjectives (cf. Fox and Hackl 2007 and Abrusán 2014). However, in the case of identity questions like (79b), no such infelicity arises: the presupposition of (79b) simply states that John has spilled something at the party (and that he believes so).

(79) a. *How much wine has John regretted that he spilled at the party?

b. What does John regret that he spilled at the party?

That the infelicity of (79a) is related to the presence of degrees is confirmed by the ill-formedness of (80), with a comparative and an equative construction.

(80) a. *We drank more wine than John regretted that he spilled at the party.

b. *We drank as much wine as John regretted that he spilled at the party.

As before, we observe that the same ungrammaticality does not arise with relative clauses: amount readings of sentences like (81) survive extraction of the head of the relative clause from a position inside the factive islands. (As discussed by Grosu and Landman (1998) and Meier (2015) modal verbs can sometimes facilitate the amount interpretation, so readers having difficulty to get at the relevant interpretation with (81a) can try (81b) instead.)

(81) a. We drank the wine that John regretted that he spilled at the party.

b. We can easily drink the wine that John regretted that he spilled at the party.

5.4 *Further similarities between amounts and kinds*

We have seen evidence that amount interpretations of relative clauses should not be taken to be degree constructions. But then, if they truly refer to an *ad hoc* kind, they should behave like kind-referring expressions across the board. Here I mention two cases where the two interpretations go hand in hand with respect to certain grammatical constraints.

First, both kind and amount interpretations of relative clauses seem to rely on the definite article. As Carlson (1977a) and Grosu and Landman (1998) discuss, amount referring relative clause constructions are only possible with the definite article (cf. fn. 14), and it seems that the

same is true of kind interpretations as well: none of the variants below have kind or amount interpretations.

(82) It will take us the rest of our lives to drink {*a / *some / *few / *two} champagne(s) that they spilled that evening.

Second, the same authors note that these readings are generally incompatible with the complementizer *which*, as demonstrated by (83).

(83) It will take us the rest of our lives to drink the champagne {that / ∅ / *which} they spilled that evening.

Finally, there are pervasive similarities between the two interpretations also when we appeal to the nouns *kind* and *amount* (Scontras 2017). For instance, the same disjointness condition applies to classifier relative clauses headed by measure nouns like *amount* and *quantity*.

(84) There are two { ?amounts / quantities } of apples on the table.

a. ✓There are two piles of apples. [only for some speakers]

b. ✘There is one pile of 12 apples weighting 3 kilos.

We can attribute the infelicity of this sentence in a situation like (84b) to the same reason that Carlson proposed for (14) above: when we reference to amounts, each object can only be counted/measured once (cf. Schwarzschild 1996). In this too kind and amount reference goes hand in hand.

Summing up, there is an undeniable similarity between the syntactic and semantic behavior of kind and amount referring relative clause constructions. These similarities speak in favor of an analysis of the two constructions where one is derived from the other. If, moreover, we add that there is no trace of degree abstraction in amount referring relative clauses, the resulting picture speaks in favor of amount interpretations of relatives clauses as being *ad hoc* kind-referring terms, and not degree constructions of any kind.

6 Concluding remarks

Kinds are often taken to be based on regularities found in nature, or regularities that can be taken to be presumed by all speakers. This paper presents an analysis of kind-referring terms that do not abide by this general rule. These *ad hoc* kind-referring expressions allow us to build a kind-referring term spontaneously, without prior agreement as to whether the purported kind counts as such. I have argued that recasting Carlson's (1977b) disjointness conditions allows us to (*i*) easily capture the semantic properties of *ad hoc* kind reference, and to (*ii*) understand, in a rather intuitive way, why these expressions are at all possible–given what we know about the preconceived nature of kinds–and how they arise.

Talking about *ad hoc* kind reference in terms of partitions comes with additional benefits. In the second part of the paper, I showed that the analysis readily extends to *the NP Relative Clause* constructions that refer to amounts and degrees, usually referred to as amount and degree relatives. The partition based analysis for *ad hoc* kind reference allows for us to construct subkinds based on equivalence classes of degrees, in the spirit of Cresswell (1976), and amount and degree relatives fall out immediately. In support of this idea, I showed that these amount relatives fail to display the hallmarks of genuine degree constructions, casting doubt on the degree-based accounts of them that have been the standard since Carlson's (1977a) original discussion of them.

Before concluding, there are a number aspects of the resulting state of affairs that deserve some commentary.

6.1 On degrees and the kind~degree connection

The assumption that degrees and amounts can be represented as equivalence classes is crucial if the analysis is to succeed. This is a conception of degrees where they are represented as sets of individuals that share the same measure along some dimension (height, size, amount, spiciness, etc.). This should not be taken, however, as a denial of simplex degrees as atomic entities (or intervals) in our ontology. In my view, the equivalence-class view is not, strictly speaking, a degree-based theory: degrees can be represented by certain kinds of sets, and so in certain circumstances we can take degrees to be a handy shortcut for these sets. This much is metaphysically parsimonious, in the sense that we need add nothing to a degree-less system so that we can talk about degrees *qua* equivalence classes. Moreover, if this approach to amount interpretations of relative clauses as *ad hoc* kind-referring terms is correct, we may have an empirical argument in favor of this conception of degrees.

There are nevertheless many semantic tasks for which equivalence classes of individuals do not seem to be well suited: adding and subtracting degrees, modifying them with measure phrases, accounting for antonyms, cross-dimension and cross-world degree comparisons, it is not straightforward to account for them if we do not have degrees proper in our language (for discussion, see Cresswell 1976, Klein 1980, 1991, Rullmann 1995 and Morzycki 2016). In general, the arguments for including degrees in our ontology seem well grounded. Now, if equivalence classes do not count towards the tally of degree theories, there is no reason to choose between the two. We can have the cake and eat it: we can have a single theory of degree semantics while still maintaining that degrees *can* be represented as equivalence classes. Thus, one contribution of this paper to our understanding of degrees is showing that representing degrees as equivalence classes is better suited for certain semantics tasks than degree semantics proper.

This points towards a research agenda whereby the explanandum is to understand (*i*) how atomic degrees and their complex, equivalence class counterparts are related (cf. Rothstein 2013) and (*ii*) the relationship between kind and the properties resulting from degree-based

equivalence classes (cf. Castroviejo and Schwager 2008, Umbach and Gust 2014, Anderson and Morzycki 2015, Scontras 2017). In a world were we have both, atomic degrees and the ability of representing them as equivalence classes, there might be ways to get from one to the other, offering a new venue to understand the behavior of degree expressions in natural languages.

6.2 *On the distribution of amount interpretations*

Recall the generalization that I put forth at the beginning of the paper.

(6) The AMOUNT ⊆ KIND generalization:
Amount interpretations of relative clauses are a form of kind interpretation.

The analysis presented here does not make predictions about when or why amount interpretations are not available. That is, it remains unexplained why (6) cannot be expressed as a biconditional statement. There are indeed some contexts where kind interpretations are quite natural, and yet amount interpretations seem to be unavailable, in such a way that no tinkering with the context will improve the situation. The clearest example is provided by demonstratives. Take the two questions in (85) and the answers in (86). Only the question in (85a) may receive an answer like (86).

(85) a. How long have you been drinking Pinot Noir?

b. How long have you been drinking three bottles of wine every day?

(86) I've been drinking that wine for ten years now. ✓(85a); ✘(85b)

This means that although (86) is a good answer to a question asking about a taxonomic kind, it is not a good answer to a question inquiring about amounts. Intuitively, the answers that work for (85b) are the minimally different answers in (87).

(87) a. I've been drinking that for ten years now. ✓(85a); ✓(85b)

b. I've been drinking that much wine for ten years now. ✘(85a); ✓(85b)

This limitation could be understood as a limitation on anaphoric demonstratives to pick degree-based equivalence classes but, of course, why that should be remains unexplained. Perhaps further investigation in the type of restrictions put forth by Umbach and Gust (2014) can shed some light on this matter.

The vexing problem of determining the distribution of amount interpretations is not limited to anaphors. For instance, consider the following examples by Meier (2015).

(88) a. Mary followed the #(number of) stars that John followed.

b. Mary shot at the #(number of) bears that John shot at.

In as much as the examples in (88) can get a kind interpretation, they should *a priori* be amenable to receive an amount interpretation too; note that the variants with *number* are perfectly sensible. But amount interpretations seems to be inaccessible in these cases. Grosu and Landman (1998) noted that these interpretations seem to be facilitated by the presence of a modal, generic, or habitual, but, as Meier (2015) showed, these are neither necessary nor sufficient conditions. Meier also identified topicality, veridicality and individual/stage-level predicate differences as playing a role as well; quite an eclectic group. The present paper does not further our understanding of the distribution of amount interpretations but for one thing: that they must be parasitic on kind interpretations.[21]

A final aspect that the present analysis remains silent about concerns the fact that the noun *kind* is incompatible with amount interpretations. That is, if amount interpretations are really *ad hoc* kind interpretations, we could expect them to arise also in the presence of the noun *kind*.

(89) a. We didn't have the soldiers that they had. ✓amount; ✓kind

b. We didn't have the kind of soldiers that they had. ✘amount; ✓kind

This problem only arises under the assumption that the operator $\kappa+$, responsible for *ad hoc* kind reference, and the noun *kind* are semantically equivalent and have the same semantic distribution. Tempting as it may be, there is no *a priori* reason why this should be the case. In fact, there are a number of common place operators in our semantic toolbox that have morphologically overt counterparts with very similar–if not identical–semantics, but whose syntactic distribution does not track each other. Some of these examples include: the operator MANY familiar from comparative constructions *vs.* the word *many* (Hackl 2000, Solt 2009, 2015), the distributivity operator D and the quantifier *each* (Link 1983, Champollion 2017), the expression *part of* and the metalanguage operator "$\leq$" (Moltmann 1998, Pianesi 2002), etc. So, before providing a solution for the pattern in (89), we should first decide whether it constitutes a real problem.

If we decide that it is indeed a problem, a simple minded solution suggests itself. We may appeal to a competition-type rationale whereby *kind* must compete with other nouns, like *amount*, *number*, *quantity*, etc., such that the availability of a more specific noun rules out more general ones, *kind* in this case. There are initial indications that something along these lines might be the case. The example in (89b) does not allow an amount interpretation, but it

21 Theories that advocate for an equality between degrees and kinds do not have difficulties in capturing this dependency, but they do not make further predictions either about when and where should amount interpretations be available. Grosu and Landman (1998, 141) state that NPs in amount relatives are simply interpreted as kinds, which results in the CP denoting a set of degrees that must be then turned into a set of individuals by an operation called SUBSTANCE. The authors assume that SUBSTANCE applies by default, but it still may be omitted to account for amount interpretations. Scontras (2017) also mentions briefly amount interpretations, which he derives via a special rule of existential modification, but there is no discussion as to how to regiment the application of this existential modification rule.

does allow other degree-based interpretations. For instance, it could refer to the fact that we did not have soldiers as big, as tall, as skillful, as motivated, etc. Crucially, none of this degree-based interpretations have a corresponding syntactic frame like *kind* and *amount* do, so the putative competition with the noun *kind* could not exist, thereby licensing the availability of degree interpretations for (89b).

(90) a. the {kind / amount / number / quantity} of soldiers

b. *the {size / height / training-skill / ...} of soldiers

In this respect, a competition-style mechanism based on available grammatical alternatives to the use of the noun *kind* may contribute to an explanation of the missing amount interpretations in the presence of *kind*.

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