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

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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*, and conveys that it is a characteristic property of typhoons to arise in the relevant part of the Pacific. In light of these referential properties of NPs, philosophers and linguists working within referential approaches to meaning have busied themselves trying to provide an answer to questions like the following: (*i*) What is a kind? (*ii*) What NPs can refer to kinds? (*iii*) What are the constraints, if any, on kind-referring terms?

1.1 Kinds as regularities

There is no agreement as to what counts as a kind. A key guiding intuition, however, is that kinds are representative of certain observable–or perceivable–commonalities that hold of a collection of objects, be it ordinary artifacts or complex things. Kinds are thus viewed as regularities that occur in nature, whose only property is that "we can impute to them a sufficiently regular behavior" (Chierchia 1998, 348). This sufficiently regular behavior is taken to be independent of the grammar, and dependent instead on the knowledge shared by the speakers.

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. These are cases where we are allowed to disregard natural regularities and build *ad hoc* 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:[1]

(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.

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1 The use of the noun *kind* is a natural way of referring to *ad hoc* kinds (examples retrieved from the internet):

(i) a. Are you the kind of student who: Relishes an academic challenge and is intellectually curious? Seeks out opportunities to help others? Wants to lead others to impact change in your local community, our environment and the world? Presents evidence of success in high school? (https://scholarships.appstate.edu/scholarships/first-year-students)

b. He's the kind of man who can work two jobs in his sleep, always has a side-hustle in mind to earn more money, and guards his savings with his life. (https://www.huffingtonpost.com/charli-penn/the-provider-the-rock-you_b_1373274.html)

The semantics of the noun *kind* itself presents difficulties that extend beyond the scope of this paper, and so I will limit myself to cases of the form *the NP Relative Clause* (for discussion see Wilkinson 1995 and Zamparelli 1998).

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.[2] 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 the fact that they eat people. Similar remarks can be made of the dogs in (4b), which refers to a kind of dog whose instantiations can be extremely heterogeneous

Above we talked of kinds as regularities that occur in nature, such that all it is required for kind reference to succeed is the agreement that we attribute them a sufficiently regular behavior. In the case of anaphoric demonstratives like (2) and (3), *ad hoc* kind reference is allowed by an earlier explicit explanation of what the relevant kind is. More interesting are cases of *ad hoc* kind reference with a modified NP–i.e. with a relative clause–, since they do not rely on any earlier reference to the target kind. In my view, this type of *ad hoc* kind reference allows us to impute a regular behavior to some subset of a kind in real time, without 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 with 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

2 I am assuming no ontological difference between kinds and subkinds. However, the term *subkind* is sometimes useful to talk about kinds of a kind, and I may use it occasionally. Others do make a difference between "well-established" kinds and "non-well-established" kinds, which Pelletier and Schubert (1989) refer to as "formal" kinds and Krifka (1995) calls "concepts". I will not assume such distinction.

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 being of the same size. This flexibility allows us to make a connection between *ad hoc* kinds and another seemingly unrelated and understudied construction that also takes the form a NP modified by a relative clause: Amount and Degree Relatives (Carlson 1977a, Heim 1987, Grosu and Landman 1998 a.o.). These relative clause constructions consist of NPs modified by a relative clause that refer to *amounts* rather than objects, as in (5), from Heim (1987, p.38).[3]

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

On its most accessible interpretation, (5) refers to the task of drinking the *amount* of champagne that was spilled that evening, not the particular object-level champagne. That is, the particular champagne that was spilled is not the object of the drinking, rather any champagne *in the same amount* will suffice. Thus, in addition to the object (6a) and kind (6b) interpretations already described, NPs modified by relative clauses also may give rise to amount interpretations (6c).[4]

(6) It will take us the rest of our lives to…

a. *Object* interpretation: ⇝ *the particular champagne*
…**pay** for the champagne they spilled that evening.

b. *Kind* interpretation: ⇝ *the type of champagne*
…**find** the champagne they spilled that evening.

c. *Amount* interpretation: ⇝ *the amount of champagne*
…**drink** the champagne they spilled that evening.

3 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 (6c), but there have been dissenting voices since (see Herdan 2008 and McNally 2008). Thus I will limit myself to constructions like (4), of the form *the NP Relative Clause*, and refer to them as relative clauses with *amount interpretations*, in order to remain theory neutral about the right taxonomy and analysis of examples like (i) and (ii).

4 I am ignoring degree interpretations here. For instance, uttering that *I couldn't eat the peppers that Liz ate* in a pepper eating competition can be understood as referring to the fact that I was not able to eat as many peppers as she did; this is the amount interpretation. However, it could also mean that I could not eat peppers *as spicy* as the ones that Liz ate, the *degree* interpretation. These cases are treated on a par with the amount interpretations in (5), so I will not differentiate between the two. The reasons for doing so become clear in §4.

Relative clause constructions like (5)/(6c) have been traditionally considered degree constructions and so they have been analyzed using the tools of degree semantics (von Fintel 1999, Grosu and Landman 1998, 2017, Herdan 2008, Meier 2015, a.o.). However, Carlson (1977a) had already made the observation that the relative clause constructions that have amount interpretations in English also have kind readings. My goal in this paper is to argue in favor of a unification of these two interpretations. In particular, the claim that I put forth is that the correct theory of the *ad hoc* interpretations in (4)/(6b) should also be a theory of (5)/(6c), and so appealing to degrees to account for the latter is not only unnecessary, but also undesirable.

The general intuition that I am following is, in a nutshell, the following. The *ad hoc* kind interpretations prompted by relative clauses in (4) and (6b) 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.
$\rightsquigarrow$ 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 $] \leftrightsquigarrow$ 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 (6c) by the same means required to account for *ad hoc* kind reference. Under this "reductionist" view, then, amount interpretations *are* a form of kind interpretation. Consequently, whenever a relative clause admits an amount interpretation it also necessarily allows a kind interpretation. This is captured by the following generalization.

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

A corollary of this new perspective is that the Amount Relatives considered here are not technically such, in the sense that they are not degree constructions involving degree expressions or operators of any kind. This conclusion, I argue, is correct.

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 (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 approaches 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 (9a), singular definite descriptions (9b) and singular indefinite descriptions, (9c); plural definite descriptions with a definite article, which occupy us here, are not included in this list.

(9) 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 (9), 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*.

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

b. *A dodo is extinct.

Second, the fact that only the indefinite variant in (11b) 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 (11b) being a characterizing sentence.

(11) 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 (9a), (9b) and (10a) from generic statements that nevertheless do not involve a kind-referring DP, such as (11b). As a conse-

quence, 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 (11b).

(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.[5] 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*.

(12) 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 (12b) 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.[6]

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).

(13) 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

5 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]

6 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 (11b) 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 (11b) and (12b) 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.

those that carry and transmit leptospirosis, which need not belong to any one taxonomic kind of rat.

(14) 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. 5). In the particular case of 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. 1). But, despite its flexibility, the noun *kind* can only refer to subkinds whose realizations are disjoint. As an example, consider (15) below, from Carlson (1977b, 212). Fido is a border collie (a kind of dog) and a watch-dog (another kind of dog). And yet (15) cannot be used to describe a situation as in (15b) where only Fido is sitting in the next room, despite the fact that Fido instantiates both subkinds in real life.

(15) 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 (16) that Ford cars do not run right.

(16) 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):

(17) 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.[7] For instance, the equivalence relation *be as old as* holds of all twins, but it does not hold of any parent-child pairs.

(18) *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.

7 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 $\forall a, b, c \in A[R(a,b) \wedge R(b,c) \rightarrow R(a,c)]$.

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

(20) *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 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.

(21) *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 (15). 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 (15) 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 (22a) with the *ad hoc* subkind of *lions that eat people* in (22b).

(22) 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 (22b), 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.[8,9]

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. Kinds can be regarded as the totality of individuals that belong to it; the kind *dog* can be identified as the

8 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.

9 The discussion is simplified at least in two respects: First, I gloss over the fact that kinds are intensional objects, and thus they require the use of world/situation variables; otherwise we could not distinguish kinds whose extensions are identical in the actual world (as with *the tyrannosaurus* and *the brontosaurus*). Second, the ontology assumed by Chierchia (1984, 1998) requires particular versions of set theory that I will not discuss here. In short, in Chierchia's (1984) system, the domain U is assumed to be a join semilattice, and kinds K are assumed to be both a subset of the atomic individuals in U as well as a subset of the intension of U, U_s. The issue is that the cardinality of U_s is greater than U and so we have to make sure that K is not so big that it does not fit into U. See Chierchia and Turner (1988) for discussion and a solution in terms of Property Theory.

sum of all individual dogs, which can then be modelled 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). This correspondence suggests that there must be mappings from one to another. In Chierchia's (1984) system, properties may be systematically mapped to their individual correlates via a nominalization function, the "down" operator $^{\cap}$. Likewise, individuals may be mapped to their corresponding properties via the inverse of $^{\cap}$, the "up" operator $^{\cup}$. That is, while the down operator is a "nominalizer", the up operator is a "predicativizer".

(23) ***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*
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 mappings in (23) are useful because they permit us to go back and forth between properties and their corresponding 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*). In effect, this means that kinds have 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. 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.

Given that we have mappings between properties and kinds, it is useful to look at some correspondences. Following the usual convention, I use small caps to name a kind, such that DOG is the dog-kind. Then, the dog-kind DOG is equivalent to the nominalization of the property of being a dog, (24a). Conversely, the property of being a dog is equivalent to the predicativization of DOG.

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

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

Let us now look at how kinds enter into the semantic computation. 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, (25a). 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, (25b).

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

b. Dogs are barking outside my window.

Example (25a) 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. (If, instead, we tried to combine a kind-level predicate with an individual-denoting object, the result is semantically ill-formed; for instance, Fido cannot be extinct.) To derive this interpretation, we simply apply the kind denoting term to the predicate.[10]

(26) $[\![(25a)]\!] = \mathit{extinct}(\textsc{dog})$

The example in (25b) 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, but to object-level instances of the dog-kind; (25b) 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:

(27) 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.

(28) $[\![(25b)]\!] = \exists x[^{\cup}(^{\cap}\lambda x\,.\,{}^{*}\mathit{dog}(x) \wedge \mathit{barking\text{-}outside\text{-}my\text{-}window}(x))]$
$= \exists x[x \leq \textsc{dog} \wedge \mathit{barking\text{-}outside\text{-}my\text{-}window}(x)]$

In prose, there is some individual specimen of DOG (some particular 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 sub-

10 Alternatively, we could take the plural property denoting the totality of dogs ($\lambda x\,.\,{}^{*}\mathit{dog}(x)$) and apply the down operator to retrieve its individual correlate: $\mathit{extinct}(^{\cap}\lambda x\,.\,{}^{*}\mathit{dog}(x))$. The choice depends on the assumptions we make about the basic denotation of bare nouns. I will disregard this issue here and treat both alternatives as equivalent.

kinds (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.

(29) **Partition funcion**
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. $\prod(\text{DOG}) = \{\text{COLLIE, PUG, GREYHOUND, BEAGLE, } \ldots\}$). 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 $\prod(\text{DOG})$ 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 $\prod(\text{DOG})$ 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 (29) 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.

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

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.

(31) $[\![\kappa]\!]([\![\text{DOG}]\!]) = \lambda y_k \,.\, \prod(\text{DOG})(y_k) = \{\text{GREYHOUND, BORDER COLLIE, BEAGLE, } \ldots\}$

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 (32a) below. Then, the result of combining *that* with (31) 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.

(32) 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. $[\![\text{that}]\!]([\![(31)]\!]) = \iota x_k \,.\, (\lambda y_k \,.\, \prod(\textsc{dog})(y_k))(x_k) \wedge \ that_i \leq x_k$
$= \iota x_k \,.\, \prod(\textsc{dog})(x_k) \wedge \ that_i \leq x_k$

Notice that we have taken a leap here in (32). 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 (31)/(32b).

3.2.3 From subkinds to *ad hoc* subkinds

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.

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

b. *The kind of dog is dangerous.

Only the variant in (33a) 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 (33) the semantic sortal is provided by the kind-referring noun *dog*, but only (33a) 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 (33b) 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.

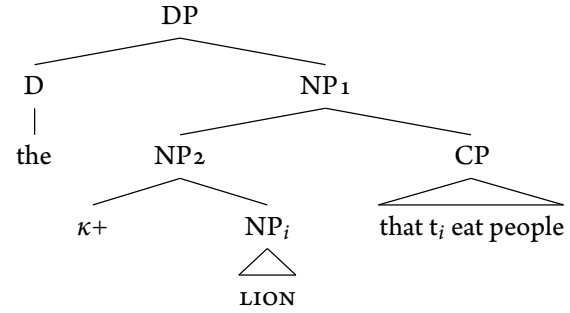
In order to capture this difference formally we can think of the relative clause as a means to further narrow the kind-referring potential of kind-referring NPs. It is in this respect that appealing to partitions becomes specially useful. We can easily modify κ so that it makes reference to an additional 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, $\kappa+$.

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

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 (22b). 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.

(35)



By the time $\kappa+$ gets to enter into the derivation, the NP already denotes a kind.[11]

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

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

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.[12] 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.

(38) $= \{$LIONS THAT EAT PEOPLE, LIONS THAT EAT ZEBRAS, LIONS THAT EAT CARRION ...$\}$

What matters most is that the modifier, the relative clause in these 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 (27) above): a sentence like (40a) asserts the existence of an instantiation of the *ad hoc* eating-people-lion-kind, and that you like (some of) those instantiations.

11 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.

12 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, ...}.

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

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

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

b. $[\![(40a)]\!] = \exists y[^{\cup}(^{\cap}\lambda z\,.\,{}^{*}lion(z) \wedge eat\text{-}people(z))(y) \wedge like(y)(you)]$
$= \exists y[y \leq \textsc{lion} \wedge eat\text{-}people(y) \wedge like(you, y)]$

Notice that, practically speaking, (40a) 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 (40a) 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. 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, (40a) is true and felicitous, an interpretation that is captured by (40b).

3.3 *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.

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.

(8) The AMOUNT ⊆ 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 phenomena. 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. Consider the following examples (adapted from Heim 1987 and Grosu and Landman 1998):

(41) 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 (41a) before: on its most sensible interpretation it refers to the *amount* of champagne that they spilled that evening, not to the actual champagne. Similarly, (41b) 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 (41) cannot be interpreted as definites, but as indefinites. For instance, in (41a) 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*.

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

What (42) shows is that relative clauses headed by the noun *amount* allow the comparison of two different sets/instances of stuff; in this case, the comparison is between an amount of champagne and amount of wine. The same, however, is not possible with ordinary looking relative clauses.

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

To be sure, the unavailability of amount interpretations that involve comparing amounts of different stuff does not rest on independent syntactic constraints. Consider for example a context where I drank two liters of champagne in 3 hours, and you drank two liters of wine in 30 minutes. In this context, (44) is false.

(44) It took me 3 hours to drink the champagne that you drank in 30 minutes.

Despite its grammaticality, the availability of an amount interpretation and the supporting context, (44) is doomed to be false in this scenario. This points out that comparing amounts of different stuff, although a natural option for classifier relatives like (42), is not possible with relative clauses like (41).

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

(45) **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.

The following paraphrases bring to the front the three properties in (45):

(46) a. (41a)↭ It would take us years to drink champagne in that amount
[where *that amount = the amount of champagne that they spilled that evening*]

b. (41b) ↭ We lost the battle because we didn't have soldiers in that amount
[where *that amount = the amount of soldiers that the Imperial Army had*]

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

4.2 *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 (41a) 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.

4.2.1 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.[13]

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:

(47) $\langle D_{tall},\ \{\langle x, y\rangle\ :\ x, y \in D_{tall}$ 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 is congruent with the underlying pre-order.[14] In this case, we can easily define an equivalence relation from $\succeq_A$ as follows.

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

Now we can partition a domain according to $\simeq_A$ as we did before. The degree of A-ness of an

13 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.

14 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).

object x, say $deg_A(x)$ can be defined as the set of all objects that stand in the $\simeq_A$ relation to x:

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

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*.[15] 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:[16]

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

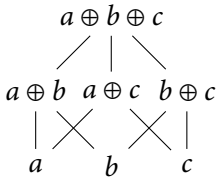
$d_{5.8f}$:	John, Sue Liz
$d_{5.9f}$:	Mary, Al
d_{6f}:	Mike, Helen
$d_{6.1f}$:	Hilary

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 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:

15 *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*).

16 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 (41a) could be measured in bottles as well.

(51) 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 $\simeq_{card}$.

(52) 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.

(53) **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 (53); the fact that $a \oplus b$ is a member of a different cell is inconsequential in this respect.

4.2.2 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 (41a), by constructing an *ad hoc* kind-referring term with the aid of a relative clause. Consider again (41a):

(41a) 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*:

(54) **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 (41a), we could envision a partition like (55) (see fn. 16).

(55) **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 sweater 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*.

(56) **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 (54), (55)

and (56) above is that different equivalence relations are picked in different contexts. Nothing else is required.

4.3 *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 (45). To see how, consider again (40a), repeated below as well.

(45) **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.

(40a) You like the lions that eat people.

On one of its readings, (40a) 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 (45). 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 (45). 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 (45). Finally, notice that we are not at liberty to choose what is the thing that you like; it must be lions.[17] This is the same *identity* restriction that we observed in (45) for amount interpretations.

To appreciate the parallelism between the two interpretations–kind and amount–in full, consider the following equivalent of the paraphrase in (46).

17 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*.

(57) You like the lions that eat people ↭ You like lions of that kind
[where *that kind = the kind of lions that eat people*]

The conclusion to be drawn is clear: we should not take the facts in (45) 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 the intuitive paraphrases provided in (46) and (57) above. Consider (41a) again, which has both kind and amount interpretations, paraphrased now as (58):

(41a) It would take us years to drink the champagne that they spilled that evening.

(58) [$_{\text{DP}}$ the champagne that they spilled that evening] ↭ 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 (59).

(59) 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 ⊆ KIND generalization introduced earlier.

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

5 Amounts without degrees

Historically, it has been assumed that degree semantics should be invoked, in some form of other, 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, denoting either a set of degrees or a maximalized

degree (Heim 1987, von Fintel 1999, Grosu and Landman 1998, 2017, Herdan 2008, Meier 2015, a.o.).[18] That is, according to this view, the CP in (60) should be treated as a degree predicate. For instance:

(60) It would take us years to drink the champagne $[_{\text{CP}}$ that they spilled that evening$]$
$[\![\text{CP}]\!] = \lambda d$. they spilled d-MUCH champagne that evening

While this is an entirely plausible option, we seem to be missing two generalizations. First, that 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, that whenever an amount interpretation is available for a relative clause construction, a kind interpretation is available as well. The consensus in the literature is, therefore, that relative clauses with amount interpretations should be treated as degree constructions, 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

18 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.

(i) a. $[_{\text{DP}}$ the $[_{\text{NP}}$ champagne $]_j$ $[_{\text{CP}}$ $[_{\text{NP}}$ d-MUCH t_j $]_i$ that they spilled t_i $]]]$
b. $[\![\text{CP}]\!] = \lambda d$. $\exists x[\mathit{champagne}(x) \wedge \mathit{they\text{-}spilled}(x) \wedge \mu_{\text{MUCH}}(x) = d])$

An in depth discussion of the problems that this type of analyses face would take us too far away from the object of the paper. Considering compositionality, for instance, the denotations of the CPs (type $\langle dt \rangle$) and the head noun (type $\langle et \rangle$) are sortally mismatched, and so their intersection should be empty. It also raises the question as to what the final denotation of the full DP *the champagne that…* should be; entity or degree denoting?

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.

(61) ***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 (61b) 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.

(62) ***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.

(63) 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.

(64) 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.

(65) *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 (65) points towards a fundamental difference in how the amount interpretations arise in (63) and (64a) on the one hand and amount interpretations such as (41a) 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.

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 (66) examples below to the impossibility of maximalizing a set of degrees that contain a negative operator in its scope.

(66) 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 ungram-

maticality (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*.

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

Now, if we look at relative clauses with amount interpretations, we observe that they pattern like (67) and unlike the examples in (66) above. Many speakers admit an amount reading of (68) 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 (68) is also available.)

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

Some speakers may need some more contextual support. Suppose that our school is competing against other neighboring schools to get some fellowship. Crucially, in order to get the fellowship there are certain stringent constraints on how many students schools may have, such that having a certain number of students may maximize your chances of obtaining the fellowship. In this case, (69) expresses that we had an amount of students such that your school did not have as many students.

(69) Our school got the fellowship because we had the students that yours didn't have.

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.)

(70) a. *How many soldiers are you wondering whether to hire to fight the Imperial Army?

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

As before, other degree constructions pattern with (70a) as well.

(71) a. *We hired more soldiers than you wondered whether to hire to fight the Imperial Army.

b. *We hired as many soldiers as you wondered whether to hire to fight the Imperial Army.

In contrast with (70a) and (71), the relative clause in (72) 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, (72) is true and felicitous.

(72) We won the battle because we had the soldiers that you wondered whether to hire to fight the Imperial Army.

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:

(73) 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 (73) above (Szabolcsi and Zwarts 1993). Under a classical approach to degree questions (e.g. von Stechow 1984), a question like (74a) 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 (74b), no such infelicity arises: the presupposition of (74b) simply states that John has spilled something at the party (and that he believes so).

(74) 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 (74a) is related to the presence of degrees is confirmed by the ill-formedness of (75), with a comparative and an equative construction.

(75) 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 (76) 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 (76a) can try (76b) instead.)

(76) 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. 3), and it seems that the same is true of kind interpretations as well: none of the variants below have kind or amount interpretations.

(77) 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 (78).

(78) 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*. Take a situation where there is a pile of apples whose amount has been determined by weight (three kilos of apples) and by numbering the apples (twelve apples). Just like kind-referring terms, (79) cannot be used to refer to these two amounts (three kilos and twelve in number), even though the pile of apples on the table is truthfully both, an amount of three kilos of apples and an amount of twelve apples.

(79) 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 (79b) to the same reason that Carlson proposed for (15) 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 two aspects of the resulting state of affairs that deserve some commentary.

6.1 On kind *and* κ

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

(8) 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 (8) 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 (80) and the answers in (81). Only the question in (80a) may receive an answer like (81).

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

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

(81) I've been drinking that wine for ten years now. ✓(80a); ✘(80b)

This means that although (81) 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 (80b) are the minimally different answers in (82).

(82) a. I've been drinking that for ten years now. ✓(80a); ✓(80b)

b. I've been drinking that much wine for ten years now. ✘(80a); ✓(80b)

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.

The analysis does not provide either a direct answer as to why 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*.[19] This is never the case, however.

(83) 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),

19 I thank Seth Cable, Louise McNally and Stephanie Solt for discussing this issue with me.

the distributivity operator D and the quantifier *each* (Link 1983, Champollion 2017), the expression *part of* and the metalanguage operator "≤" (Moltmann 1998, Pianesi 2002), etc. So, before providing a solution for the pattern in (83), 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 (83b) does not allow an amount interpretation, but it 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 (83b).

(84) 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*.

6.2 On degrees

The assumption that degrees can be represented as equivalence classes is crucial if my analysis is to succeed. This is a conception of degrees where they are represented as sets of individuals that have 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 are not well suited: adding and subtracting degrees, modifying them with measure phrases, accounting for antonyms, cross-dimension and cross-world degree comparisons, all are problematic 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 includ-

ing 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*) whether the properties resulting from degree-based equivalence classes are related in any way to kinds (cf. Schwager 2009, 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.

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