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# **AMOUNT RELATIVES REDUX**

A Dissertation Presented

by

**JON ANDER MENDIA**

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

**DOCTOR OF PHILOSOPHY**

September 2017

Linguistics

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# AMOUNT RELATIVES REDUX

A Dissertation Presented

by

JON ANDER MENDIA

Approved as to style and content by:

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Rajesh Bhatt, Co-chair

---

Vincent Homer, Co-chair

---

Seth C. Cable, Member

---

Barbara H. Partee, Member

---

Daniel G. Altshuler, Member

---

Seth C. Cable, Department Chair  
Linguistics

## **DEDICATION**

Dedicated to the memory of my grandfathers:

José Andrés Mendia Retes (1927–2013)

and

Segundo Aldama Mendia (1930–2017)

*Eser gaitezen sutondoan eta esadazu  
zelan altxatu den hezur zurien artetik  
udaberria.*

Joseba Sarrionandia

## ACKNOWLEDGMENTS

“So here it is at last, the distinguished thing!” These words were famously proclaimed by Henry James on his deathbed, but they might as well serve as the epigraph of this dissertation—a much happier occasion at any rate. With this I bring to a close my journey at UMass. I could not have done it alone, especially because I had no idea of what I was myself getting into when I crossed the ocean for the first time. Five years and some gray hairs later, I can finally address a few lines to those who made it possible to bring “the distinguished thing” to fruition.

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# ABSTRACT

## AMOUNT RELATIVES REDUX

SEPTEMBER 2017

JON ANDER MENDIA

B.A., UNIVERSITY OF THE BASQUE COUNTRY

M.A., UNIVERSITY OF THE BASQUE COUNTRY

Ph.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Professor Rajesh Bhatt and Professor Vincent Homer

This dissertation provides a novel analysis of Amount Relatives (Carlson 1977a, Heim 1987, Grosu and Landman 1998, Herdan 2008, Meier 2015, a.o). Amount Relatives are a form of non-intersective relative clause that is usually associated with amount interpretations. For example, the sentence *it will take us the rest of our lives to drink the champagne they spilled that evening* is most naturally interpreted as referring to an *amount* of champagne, and not any particular champagne. Previous accounts of Amount Relatives have converged in appealing to degree semantics in order to extract an amount from the relative clause, suggesting that the embedded CP denotes a property of degrees.

This dissertation advocates a more nuanced view of Amount Relatives across languages. I propose that natural languages allow two different strategies for deriving amount interpretations of relative clauses: a degree-based strategy and a degree-less strategy, where degree semantics does not come into play at all. It is argued that while some languages employ both

strategies, as is the case with Spanish, languages like English only have the degree-less strategy, contra much of the previous literature. Evidence for this division comes from the fact that Amount Relatives in Spanish, but not English, pass independently-motivated diagnostics of degree-related operations (e.g. degree-quantification and degree-abstraction).

In the first part of the dissertation, I propose a novel means of arriving at amount interpretations for relative clauses in languages like English, which lack the degree-based strategy to derive such meanings. The account exploits the correlation between kind and amount readings of relative clauses in English, first noted by Carlson (1977a). Amount Relatives in English will be argued to be a sub-case of kind-referring relative clauses and an analysis that derives amounts from (sub)kinds is presented.

The second, more sizable portion of the dissertation examines Amount Relatives in Spanish, which can be shown to make use of a degree-based strategy for deriving amount readings, as they do show all the hallmarks of degree constructions. Moreover, the language allows amount interpretations more readily, in more environments and with more diverse forms than languages like English. I will provide a compositional analysis of Spanish Amount Relatives in their various forms, with the goal of understanding (*i*) what syntactic and semantic pieces are implicated in extracting an amount from a relative clause structure and (*ii*) how different permutations of these pieces could result in semantic variation within and across languages.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Amount Relatives: relative clauses with quantity interpretations

This dissertation is concerned with Amount Relatives, relative clauses that receive quantity-oriented interpretations (Carlson 1977a, Heim 1987, Grosu and Landman 1998, 2017, Herdan 2008, McNally 2008, Meier 2015, a.o). Consider the following example, from Heim (1987, p.38).

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

The sentence in (1) is ambiguous. On its ordinary interpretation, the relative clause simply picks out the particular champagne that was spilled that evening, and the sentence on the whole is about the time it will take to drink that spilled champagne. This is the meaning we arrive at when, following the traditional analysis (Quine 1960, Partee 1973), we interpret the relative clause by intersecting the predicate denoted by the head noun with the predicate denoted by the *that*-clause. The resulting meaning is of the form “*x* is champagne and *x* was spilled that evening”. This corresponds to what is known as the intersective interpretation of relative clauses.

But this is not the most accessible interpretation of the sentence. On its most salient reading, (1) refers to the task of drinking the *amount* of champagne that was spilled that evening. In this case, the particular champagne that was spilled is not the object of the drinking, rather any champagne *in the same amount* will suffice. This interpretation of (1) is more straightforwardly captured by both of the following paraphrases.

- (2) a. It will take us the rest of our lives to drink the *amount of* champagne they spilled that evening.
- b. It will take us the rest of our lives to drink *as much* champagne *as* they spilled that evening.

The examples below provide similar cases. Under the relevant interpretation, they all make a claim about an amount, not about an individual.

- (3) a. Mary saw the birds in thirty minutes that John saw in a day. [Meier 2015]  
 ~> *Mary saw the number of birds that John saw*
- b. We lost the battle because we lacked the soldiers our enemy had. [McNally 2008]  
 ~> *We lacked the amount of soldiers that our enemy had*
- c. The money it cost could have fed many people. [Grosu and Landman *to appear*]  
 ~> *The amount of money it cost*

Because of their semantic ability to refer to amounts, these relative clauses were named “Amount Relatives” by Carlson (1977a). I will continue this tradition in this dissertation, henceforth using the acronym AR to refer to Amount Relatives.

## 1.2 Why Amount Relatives?

### 1.2.1 A family of three

Ordinary relative clauses usually refer to individuals. ARs like (1) and (3) got this name from Carlson (1977a) because, at an intuitive level, they seem to refer to an amount or quantity rather than to particular entities. In addition to the ordinary-looking relative clauses in (1)/(3), Carlson (1977a) argued that ARs come (at least) in two additional syntactic frames: (i) in relative clauses where relativization occurs out of *there-be* existential sentences, as in (4a), and (ii) in Antecedent Contained Deletion constructions, where the trace of the head of the relative clause is contained within an elided phrase, as in (4b).

- (4) a. There wasn't the water in the sink that there was in the bathtub.  
       ~> *the amount of water* [attributed to Lisa Selkirk]
- b. Marv put everything he could in his pocket.  
       ~> *the amount of things that he could put* [Carlson 1977a]

Observe that both sentences in (4) are ambiguous; in addition to the amount interpretation, the ordinary intersective interpretation is also available. In the case of (4a), this intersective interpretation yields a truism, namely, that the water in the sink is not the water in the bathtub. On its most natural interpretation, however, it refers to different *amounts* of water. Similarly, on the ordinary intersective interpretation of the relative clause in (4b), for every  $x$  such that Marv could put  $x$  in his pocket, Marv did put  $x$  in his pocket. However, the most accessible interpretation of (4b) is one in which Marv got a pocketful of things, without necessarily putting in his pocket all the objects that would have otherwise fit in it individually.

Thus, on Carlson's (1977a) account, there are three varieties of ARs, all of which involve a special sort of relativization that yields the quantity interpretation.

(5) **Three types of ARs**

a. *Ordinary Relative Clauses*

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

b. *Existential Relative Clauses*

There wasn't the water in the sink that there was in the bathtub.

c. *ACD Relative Clauses*

Marv put everything he could in his pocket.

Support for the idea of ARs as a homogeneous phenomenon has come from a number of authors since Carlson, including Heim (1987), von Stechow (1999), Grosu and Landman (1998, 2017) and Meier (2015). But there are dissenting voices as well: for instance, Herdan (2008)

and McNally (2008) are defendants of the position that not all ARs described by Carlson belong to the same class.

Carlson's (1977a) original arguments in favor of treating the three constructions in (5) in a uniform fashion relied on certain syntactic similarities among the three. For instance, relative clauses yielding a quantity interpretation seem to show selectional restrictions on the relative pronoun. As Heim (1987) observed, the availability of the amount interpretation of sentences like (6) below depends on the presence of the null/*that* complementizer.<sup>1</sup> The use of *which* in (6a), at least for most speakers, leads to the clause only receiving an ordinary intersective interpretation. In the case of existential relative clauses and those involving ACD, the use of *which* results in ungrammaticality.<sup>2</sup>

- (6) a. It will take us the rest of our lives to drink the champagne { $\emptyset$  / that / which} they spilled at the party.
- b. There wasn't the water in the sink { $\emptyset$  / that / \*which} there was in the bathtub.
- c. Marv put in his pocket everything { $\emptyset$  / that / \*which} he could.

Another well-known property of ARs that differentiates them from garden-variety restrictive relative clauses is that ARs require definite or universal determiners. Consequently, the sentences in (7), involving existentially quantified head nouns lack amount readings.

- (7) a. It will take us the rest of our lives to drink some champagne they spilled that evening.
- b. Marv put many things he could in his pocket.
- c. \*I took {**some** / **many**} books that there were on the table.

---

<sup>1</sup>There are conflicting judgments in Carlson (1977a) and Safir (1982); see Heim (1987) for discussion.

<sup>2</sup>These judgments are more clear when relative clauses are headed by nouns that are more commonly interpreted as referring to amounts (examples from McNally 2008).

- (i) a. \*The money which costs makes no difference  
b. \*There wasn't the money in the wallet which there was on the table.  
c. \*Marv put every pound of sand which he could in the truck.

The fact that the three constructions in (5) pattern alike and unlike ordinary relative clauses led Carlson (1977a) to suggest that they all form a uniform class, different from ordinary restrictive relatives.

### 1.2.2 Different interpretations of relative clauses

Of course, beyond these syntactic constraints, the three types of constructions in (5) are unified by the *semantic* fact that they can refer to quantities or amounts. As it happens, the syntactic tests alone are sometimes misleading. It is not difficult to find relative clauses with the syntactic properties noted by Carlson (1977a) that do not in fact refer to amounts. Consider:

(8) I took the books that there were on the table.

The sentence in (8) is an AR by the syntactic measures usually taken in the literature to characterize ARs (Carlson 1977a, Heim 1987, von Stechow 1999, Grosu and Landman 1998). However, (8) can only be true if I took the particular books that were lying on the table. That is, a situation in which I took a different set of books, but equal in amount, to the books on the table cannot verify (8). In short, despite qualifying as an Amount Relative, (8) cannot refer to amounts.

For reasons like this, it is useful to differentiate between ARs—as they have been classified in the literature—and relative clauses that refer to amounts. The goal is simply to provide a descriptive, analysis independent way to refer to different interpretations of relative clauses. Thus, I differentiate between three main different interpretations that relative clauses may give rise to: OBJECT, AMOUNT and KIND interpretations. (I will follow the typographical convention of using small caps when referring to these interpretations.) The following relative clauses illustrate the differences (with minimal changes to promote the intended interpretation).

(9) 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. AMOUNT interpretation: ↷ *the amount of champagne*  
 ...**drink** the champagne they spilled that evening.
- c. KIND interpretation: ↷ *the type of champagne*  
 ...**find** the champagne they spilled that evening.

The OBJECT interpretation corresponds simply to the intersective interpretation of the relative clause, and it refers to individual objects or tokens. The AMOUNT interpretation corresponds to an interpretation where the relative clause makes reference to an amount of objects, and not to any particular object. Lastly, the KIND interpretation also does not refer to a particular token of champagne; rather, it refers to some kind of champagne.<sup>3</sup>

### 1.2.3 Goal of the dissertation

The overarching goal of this dissertation is to shed light on how seemingly ordinary-looking relative clauses receive AMOUNT interpretations. I will be concerned here only with relative clauses like (1), (3) and (5a) above, and will not be examining existential or ACD relative clauses.<sup>4</sup> Answering this question requires, in essence, resolving a compositional problem. For reasons that will become obvious shortly, I take a cross-linguistic approach to this compositional problem, addressing another question along the way: how does the availability and composition of ARs vary across languages? As it happens, two languages that both allow ARs may still vary in what environments and how readily they allow them. Here, I take Spanish

---

<sup>3</sup>Notice that OBJECT interpretations may seem to entail both AMOUNT and KIND readings of relative clauses. If I took all the books there were on the table, I certainly took the same amount of books as there were books on the table. Similarly, if I found a bottle of *Dom Pérignon* then I certainly found a certain kind of wine (in this case one that belongs to an assemblage of Pinot Noir and Chardonnay grapes). This apparent entailment falls out from world knowledge: we cannot prevent pluralities of books from constituting an amount, nor can we avoid wines from belonging to a certain kind. In contrast, AMOUNT interpretations directly refer to an amount of objects, irrespective of the particular objects that sum up to constitute said amount—and same with kind-referring relative clauses.

<sup>4</sup>Although there has not been much discussion about these two other constructions, McNally (2008) (for existential relative clauses) and Herdan (2008) (for ACD relative clauses) provide good arguments that neither of them should be treated on par with ARs—understood as relative clauses with AMOUNT interpretations. The idea that not all ARs described by Carlson belong to the same class has not, to my knowledge, been pursued further.

and English as my case studies. As will be described in the following sections, Spanish differs from English in allowing AMOUNT interpretations (i) more readily, (ii) in more syntactic environments, and (iii) with different types of relative clauses. Thus, the differences between English-like and Spanish-like languages bear on the compositional puzzle presented above by suggesting that there is more than one strategy available in natural languages to generate AMOUNT interpretations in relative clauses.

### 1.3 Rethinking AMOUNT interpretations

The first question of interest to us is: how do ordinary-looking relative clauses provide AMOUNT interpretations? From the point of view of classical analyses to (intersective) relative clauses (e.g. Quine 1960, Partee 1973), the availability of AMOUNT interpretations is puzzling. For instance, the intersective interpretation of the relative clause *the champagne they spilled that evening* would simply denote the set of (instances of things) that (i) are champagne and (ii) they spilled that evening.

$$(10) \{x : x \text{ is champagne}\} \cap \{y : \text{they spilled } y \text{ that evening}\}$$

But this, of course, corresponds to the OBJECT interpretation of the relative clause. Thus, in order to fully understand what the compositional challenge is, we should first look into the main semantic properties of these interpretations.

#### 1.3.1 Semantic properties of AMOUNT interpretations

Pre-theoretically, there are three main semantic properties of AMOUNT interpretations that set them apart from OBJECT interpretations. Their first and most notorious property is that they do not refer to individuals, but to “amounts”. 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. In other words, using our example in (9), the definiteness of the definite determiner *the* does not apply to the NP *champagne*, but to

an amount; in this case, the definite amount of champagne that they spilled that evening (e.g. two liters, or perhaps two bottles).

The flip-side of this property is that the NP *champagne* cannot be interpreted as a definite, but as an indefinite. In (9), 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, again, the head noun, on the surface, is a definite NP (*the champagne*).

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*.

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

What (11) 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.

(12) \*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, (13) is false.

(13) 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, (13) 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 (11), is not possible with AMOUNT interpretations of relative clauses.



Summing up, any theory of ARs should be able to capture these three empirical facts about AMOUNT interpretations of relative clauses. I summarize them below.

(14) **Desiderata for AMOUNT interpretations**

- a. *Definiteness*: AMOUNT interpretations refer to a definite amount.
- b. *Indefiniteness*: The head of the relative clause is interpreted as an indefinite.
- c. *Identity*: AMOUNT interpretations require a comparison of two amounts of same stuff.

A helpful paraphrase to help appreciate the particularities of AMOUNT interpretations is the following:

- (15) [[It would take us years to drink the champagne that they spilled that evening]]  
↔ [[It would take us years to drink champagne in that amount]]  
[where *that amount* = *the amount of champagne that they spilled that evening*]

As stated in (14), the relative clause is interpreted as referring to a definite amount of champagne: the specific amount of champagne that they spilled that evening. However, the noun champagne must be interpreted as an indefinite: there is no particular champagne that it would take us long to drink. Finally, the referred amount must be an amount of champagne, not of anything else.

### 1.3.2 But not just AMOUNTS!

These properties of AMOUNT interpretations have been known since Carlson's (1977a,b). However, he had already noted that the properties in (14) are not unique to amount interpretations. For instance, consider the sentence in (9c), repeated below.

- (9c) It will take us the rest of our lives to find the champagne they spilled that evening.

On its most salient interpretation, (9c) receives a form of KIND interpretation. For instance, it could be that the champagne is difficult to find because it is very rare. This is only one of

many possible reasons; it could also be that there is a high demand of that particular kind of champagne, that it is not usually imported to our country, etc.<sup>5</sup> All these interpretations have the same properties of AMOUNT interpretations described in (14). For one, the sentence does not refer to a particular champagne, despite being overtly of the form *the champagne that...* This is precisely the condition on *indefiniteness* of the head of the relative clause described in (14). Similarly, the sentence refers to a definite kind of champagne, the precise kind of champagne that they spilled that evening. This is, again, fully parallel to the condition on *definiteness* described in (14). Finally, notice that we are not at liberty to choose what is the thing that would take us the rest of our lives to find; it must be champagne. This is the same *identity* restriction that we observed in (14) for AMOUNT interpretations. To appreciate the parallelism between KIND and AMOUNT interpretations in full, consider the following equivalent of the paraphrase in (15).

- (16) [[It would take us years to find the champagne that they spilled that evening]]  
 ⇔ [[It would take us years to find champagne of that kind]]  
 [where *that kind* = *the kind of champagne that they spilled that evening*]

The conclusion to be drawn is clear: we should not take the facts in (14) to be signatures of AMOUNT interpretations alone. We have at least two types of interpretations, KINDS and AMOUNTS, showing the same type of semantic effects. This state of affairs raises a question: are we justified in appealing to degree semantics to account for AMOUNT interpretations? To my knowledge, this is not a question that has been explicitly addressed in the literature. Historically, analyses of ARs have simply assumed—largely without discussion—that degree semantics should be invoked, in some form or 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 in ARs the embedded CP is a degree

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<sup>5</sup>Because this type of interpretation goes beyond what we usually think of taxonomic kinds, it is sometimes referred to as an “extent” interpretation of the noun phrase. I will continue to call it simply a KIND interpretation for consistency, but it should be clear that this interpretation is in fact richer than a well-established KIND.

expression, denoting either a set of degrees or a maximalized degree (Heim 1987, von Stechow 1999, Grosu and Landman 1998, 2017, Herdan 2008, Meier 2015).<sup>6</sup> That is, according to this view, the CP in (17) should be treated as a degree predicate. For instance:

- (17) It would take us years to drink the champagne [<sub>CP</sub> that they spilled that evening]  
[[CP]] =  $\lambda d$  . they spilled  $d$ -MUCH champagne that evening

While this is an entirely plausible option, we seem to be missing a generalization, namely, that AMOUNT and KIND interpretations share the key semantic properties that make ARs stand out and behave unlike intersective relative clauses.

### 1.3.3 AMOUNTS without degrees

It was Carlson (1977a,b) who first observed that KIND and AMOUNT interpretations of relative clauses go hand in hand. Following his lead, this dissertation presents a unification of these two interpretations. While there have been attempts to unify the semantics of kinds and degrees/amounts (Anderson and Morzycki 2015, Scontras 2017), here I take a different angle: I argue that AMOUNT interpretations of relative clauses *are* a form of KIND interpretation.

So far we have seen that English allows AMOUNT interpretations of relative clauses. In this sense, ARs exist in English. The challenge is to determine whether this AMOUNT interpretation requires a dedicated “Amount Construction”, i.e. a construction specifically designed to obtain AMOUNT interpretations. Previous accounts have answered this question in the positive, by assuming, as in (17) above, that the embedded CP in ARs must be interpreted as a property of degrees. This dissertation argues against this conclusion by subsuming AMOUNT interpretations in English under KIND interpretations. Consequently, (i) there is no degree abstraction/quantification involved, and (ii) whenever a relative clause admits an AMOUNT interpretation it also necessarily allows a KIND interpretation.

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<sup>6</sup>This is usually achieved with the aid of some null measuring predicate MANY/MUCH, like the ones familiar from the literature on comparatives and measure phrases.

There a number of reasons to believe that such unification is not only possible, but desirable. Here I will only mention two; I refer the reader to §2 for further arguments and the full analysis. First, AMOUNT interpretations of relative clauses do not necessarily rely on the presence of a relative clause. That is, provided that we have enough contextual support, the relative clause might be dropped altogether. The examples in (18) show that both AMOUNT and KIND interpretations are possible with nouns modified by PPs.

(18) **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 (18a) might refer to the fact that the reason for losing the battle was that we did not have as many soldiers as the Imperial Army did. This is the AMOUNT interpretation. Alternatively, it could be that despite having more soldiers than the Imperial Army, ours are poorly trained, lack motivation, etc. This is the KIND interpretation. Thus, we observe that the relationship between the availability of both interpretations is preserved. More importantly, however, under an account of AMOUNT interpretations where we rely on degree operators and degree abstraction at the CP level, the availability of AMOUNT in (18a) is left unexplained. Similar interpretations are available with bare DPs as well.

(19) **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.

Again, a degree-based analysis has nothing to say about why AMOUNT interpretations are possible in (19).

The second argument rests on the fact that AMOUNT interpretations of relative clauses do not show the hallmarks of *bona fide* degree constructions. For instance, the interaction be-

tween degree operators and negative operators is well known in the literature of comparative constructions (e.g. von Stechow 1984). Under Rullmann's (1995) popular view, the ill-formedness of the (20) examples below are attributed to the impossibility of maximalizing a set of degrees that contain a negative operator in its scope.

- (20) 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.

The explanation of this ill-formedness goes as follows: the embedded CPs must be closed by a maximality operator which, as commonly defined, presupposes a maximal degree among all the degrees in the set that it ranges over (see definitions of *MAX* in §4.3.2.1 and §5.3.1). In the absence of such maximal degree, the expression is undefined, resulting in ungrammaticality—in the sense of Gajewski (2002). That is, in the examples above, there cannot be a maximal number of soldiers that the Imperial Army did not have, and thus the maximalization of the set of degrees corresponding to *the Imperial army has d-many soldiers* is undefined.

These types of island violations, however, do not arise in cases where the extractee denotes an individual, as with the *wh*-words *which* and *what*.

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

If we look at relative clauses with *AMOUNT* interpretations, we observe that they pattern like (21) and unlike (20). The *AMOUNT* interpretation of (22) states that our soldiers exceeded in number those of the Imperial Army. (Out of the blue, the *KIND* interpretation of (22) is also available.)

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

The problem for degree-based analysis of ARs is obvious: if the burden of extracting an *AMOUNT* is located on a degree operator, we would expect ARs to pattern with (20) and not with (21), contrary to what we observe.

### 1.3.4 Conclusion

As I hope was made clear from the above discussion, there are good reasons to believe that the AMOUNT interpretations of relative clauses in English should not be analyzed by appealing to degree semantics. A reductionist approach that subsumes AMOUNT interpretations under KIND interpretations looks more promising, as it is able to capture: (i) the inherent vagueness of these relative clauses (see §1.3.1 and §1.3.2), (ii) the fact that they do not depend on the presence of a relative clause, and (iii) the fact that they are not subject to the restrictions that other degree constructions are. Chapter 2 discusses all this in greater detail.

## 1.4 ARs as degree expressions

Most investigations about ARs in general have focused on English, and the question of how languages may vary with respect to the distribution and availability of AMOUNT relative clauses has seldom arisen. An important part of this dissertation is focused on Spanish and on its ability to produce relative clauses with AMOUNT interpretations in environments where English cannot, and using forms unavailable in English.

### 1.4.1 A contrast between English and Spanish

The theoretical discussion of ARs began with an exploration of English ARs, and the efforts to derive the availability of English relative clauses to denote AMOUNTS. More mysterious are the conditions under which English relative clauses do not allow AMOUNT interpretations. For instance, the following sentence in English can only be false.

(23) Pedro has written the books that Tolstoy wrote.

Here, the falsity of the sentence hinges on the fact that Pedro could not have written the same *individual* books as Tolstoy did. This is an OBJECT (intersective) interpretation of (23). In contrast, an AMOUNT interpretation would be perfectly sensible. For reasons that are not well-understood, however, (23) cannot express that Pedro has written as many books as Tolstoy.

This restriction is useful because it reveals a surprising contrast with the same sentence in Spanish. Consider:

(24) Pedro ha escrito los libros que Tolstoy escribió.

Pedro AUX written the books that Tolstoy wrote

‘Pedro has written as many books as Tolstoy wrote’

Unlike with its English counterpart, in (24) the AMOUNT interpretation is perfectly natural, and it can be used out of the blue to express that Pedro wrote as many books as Tolstoy. This state of affairs raises questions about cross-linguistic variation in the availability of AMOUNT interpretations: what is the source of the contrast between (23) and (24)? The following are two more examples where the English variants are false, signaling that the AMOUNT interpretations are not available.

(25) [*Context*: The same number of friends attended both our birthday parties, but they were different friends.]

a. The friends that came to your party came to my party. FALSE

b. A mi fiesta vinieron los amigos que vinieron a la tuya. TRUE

to my party came the friends that came to the yours

‘The number of friends that came to your party came to my party’

(26) [*Context*: There were 3 books on the table, and I read 3 books from the shelf.]

a. I read the books that there were on the table. FALSE

b. He leído los libros que había en la mesa TRUE

AUX read the books that were on the table

‘I read the amount of books that there were on the table’

In this dissertation, I argue that the source of the different availability between the two languages is the different strategies they employ to generate AMOUNT interpretations. While in

English relative clauses can only express AMOUNTS via KIND interpretations, Spanish does possess a dedicated Amount Construction whose exclusive role is to provide AMOUNT interpretations.

Evidence for the presence of a dedicated Amount Constructions in Spanish rests on data of the sort discussed above and others. As will be demonstrated shortly, none of the arguments I provided in §1.3 in support of a degree-less analysis of English ARs hold for these Spanish examples. The conclusion, therefore, is that English ARs and their Spanish counterparts are constructed in fundamentally different ways.

#### 1.4.1.1 No dependency on KIND interpretations

Section 1.3 showed that KIND and AMOUNT interpretations of relative clauses go hand in hand. In the Spanish examples above, however, this is not the case. For example, (24), repeated below, only the (false) OBJECT interpretation and the more sensible AMOUNT interpretation.

(24) Pedro ha escrito los libros que Tolstoy escribió.

Pedro AUX written the books that Tolstoy wrote

↷ ‘Pedro has written *as many* books *as* that Tolstoy wrote’

↷ ‘Pedro has written the *same kind of* books that Tolstoy wrote’

Thus, the sentence cannot mean, for instance, that, like Tolstoy, Pedro also wrote novels, novellas and plays but not biographies, or that Pedro also wrote Russian novels, or novels that were as long as Tolstoy’s. The same is true of (26):

(26) He leído los libros que había en la mesa.

AUX read the books that were on the table

↷ ‘I read the *amount of* books that there were on the table’

↷ ‘I read the *kind of* books that there were on the table’



### 1.4.1.2 Obligatoriness of the relative clause

The Spanish examples also contrast with English in that the relative clause is obligatory: it cannot be dropped or substituted by a PP (cf. (18) and (19)). When the relative clause is dropped, both the KIND and the AMOUNT interpretations disappear, and only the OBJECT interpretation of the NP is available.

(27) Pedro ha escrito los libros ( de Tolstoy ).

Pedro AUX written the books of Tolstoy

~ 'Pedro has written some *particular* books.'

↷ 'Pedro has written some *amount of* books.'

(28) He leído los libros ( de la mesa ).

AUX read the books of the table

~ 'I read some *particular* books'

↷ 'I read some *amount of* books'

Thus, the Spanish examples contrast with the English facts discussed in §1.3.3 above, where AMOUNT interpretations were accessible also in the absence of a relative clause.

### 1.4.1.3 Obeys restrictions on islands

The final datapoint to suggest that the Spanish examples at hand truly involve degree operators comes from island-sensitivity. As in the case of English (see §1.3.3), negative operators embedded inside degree constructions, like *how many* questions, comparatives and equatives, result in an island-violation in Spanish. This is shown in (29),

(29) a. \*Cuántos libros no has escrito?

how many books not AUX written

'How many books you have not written?'

- b. \*Pedro escribió más libros que Tolstoy no escribió.  
 Pedro wrote more books that Tolstoy not wrote  
 ‘Pedro wrote more books than Tolstoy didn’t write’
- c. \*Pedro escribió tantos libros como Tolstoy no escribió.  
 Pedro wrote many books as Tolstoy not wrote  
 ‘Pedro wrote as many books as Tolstoy didn’t write’

Again, Spanish patterns with English in that these island violations do not arise in cases where the extractee denotes an individual. For instance, (30) is a sensible question that one may ask to George R.R. Martin about his saga *A song of ice and fire* (whose culmination seems uncertain as of 2017).

- (30) Qué libros no has escrito?  
 what books not AUX written  
 ‘What books have you not written?’

The difference, however, is these Spanish ARs are sensitive to negative islands: in (31), the variant of (24) with the crucial difference that the embedded CP contains a negative operator, the AMOUNT interpretation is unavailable (the OBJECT interpretation unsurprisingly remains).

- (31) Pedro escribió los libros que Tolstoy no escribió.  
 Pedro wrote the books that Tolstoy not wrote  
 ~ ‘Pedro wrote some *particular* books that Tolstoy didn’t write’  
 ↯ ‘Pedro wrote an *amount of* books that Tolstoy didn’t write’

The conclusion that I extract from these different behavior of AMOUNT relative clauses in English and Spanish is that they involve two different types of derivations. In particular, I suggest the following:

(32) **Available strategies to generate AMOUNT interpretations by language**

	AMOUNTS via KINDS	AMOUNT via degrees
Spanish	✓	✓
English	✓	✗

Notice that nothing precludes Spanish from deriving AMOUNT interpretations via KINDS, as English does. This is a welcome result: if a relative clause allows a KIND interpretation, then the properties observed for English AMOUNT interpretations hold of Spanish as well:

(33) **AMOUNT/KIND vagueness**

- a. The Imperial Army has some soldiers that are {good/big/well trained} and although we have more soldiers, they always win.
- b. Perdimos la batalla porque no teníamos los soldados que tenía la Armada Imperial.  
lost the battle because not have the soldiers that had the Army Imperial  
'We lost the fight because we didn't have the *kind of* soldiers that the Imperial Army had'

(34) **No relative clause**

- a. *PP modifier*  
Perdimos la batalla porque no teníamos los soldados de la Armada Imperial.  
lost the battle because not have the soldiers of the Army Imperial  
'We lost the fight because we didn't have the *amount of* soldiers of the Imperial Army'

b. *Bare DP*

Perdimos la batalla porque no teníamos los soldados.

lost the battle because not have the soldiers.

‘We lost the fight because we didn’t have the *amount of* soldiers’

(35) **No islands**

a. Ganamos la batalla porque teníamos los soldados que no tenía la Armada  
won the battle because have the soldiers that not had the Army  
Imperial.

Imperial.

‘We won the battle because we had the *amount of* soldiers that the Imperial Army  
didn’t have’

Thus, it is only by looking at cases where (i) KIND interpretations are not available and, therefore, (ii) do not allow AMOUNT interpretations in English, that we can identify the Spanish cases that showcase the true dedicated Amount Construction.

## 1.4.2 More ARs in Spanish

In this section I introduce the full family of ARs in Spanish. In this language, not only are ARs more readily available than in English, we also find them in more environments and in different forms than in English. The richness of the AR constructions in Spanish provides further support to the idea that Spanish has dedicated machinery for extracting AMOUNTS in relative clause constructions.

### 1.4.2.1 Nominal ARs

So far, we have only considered ARs with AMOUNT interpretations that appear in positions typically occupied by (entity-denoting) arguments. For this reason, I will refer to them as “Nominal ARs”. The distinguishing property of Spanish, as we have observed in the previous section, is that it shows a greater degree of freedom in the construction of nominal ARs, and

allows them in environments where they seem to be impossible in English (see the contrasts in §1.4.1).

Furthermore, Spanish nominal ARs are semantically parallel to their counterparts with *wh*-pronouns. Spanish has the ability to form quantity free relatives, which are not cross-linguistically very common. Quantity free relatives are free relatives formed with the quantity relative pronoun *cuanto* (“how many”).

- (36) a. He visto cuantos pájaros has visto tú.  
aux seen how many.MS.PL birds AUX seen you
- b. Pedro ha escrito cuantos libros escribió Tolstoy.  
Pedro AUX written how many.MS.PL books wrote Tolstoy

Nominal ARs in Spanish are the object of Chapter 3.

### 1.4.2.2 Propositional ARs

In Spanish ARs can appear as complements to *wh*-embedding predicates, predicates that typically select for either interrogative or exclamative complements. I refer to this type of ARs as “Propositional ARs”. The interest of propositional ARs lies in the fact that they seem to be DPs that are selected for by predicates that usually select interrogative complements, like *wonder*. In cases of predicates like *know*, propositional ARs are grammatical even when the corresponding bare DP is not.

- (37) a. Me pregunto las manzanas que trajo Pedro.  
I.DAT ask the.FM.PL apples that brought Pedro  
‘I wonder how many apples Pedro brought’
- b. Sé las manzanas (\* que trajo Pedro ).  
know the.FM.PL apples that brought Pedro  
‘I know how many apples Pedro brought’

Semantically, the sentences in (37) have an interpretation that is equivalent to a subordinate question with the *wh*-pronoun *how many*.<sup>7</sup>

- (38) a. Me pregunto cuántas manzanas trajo Pedro.  
I.DAT wonder how many.FM.PL apples brought Pedro  
'I wonder how many apples Pedro brought'
- b. Sé cuántas manzanas trajo Pedro  
know how many.FM.PL apples brought Pedro  
'I know how many apples Pedro brought'

Propositional ARs are thus similar to the ARs discussed in the literature in being about an amount rather than about an individual. But the syntactic distribution of the ARs in English is radically different; unlike the counterparts of (38), the English variants of (37) are either ungrammatical or lack an AMOUNT interpretation.

- (39) a. I wonder {\*the apples that / how many apples} Pedro brought.  
b. I know {#the apples that / how many apples} Pedro brought.

Chapter 4 discusses these constructions at length.

### 1.4.2.3 Degree Neuter Relatives

The last construction of Spanish considered in this dissertation are the so-called Degree Neuter Relatives. These are relative clauses headed by a gradable predicate and the form *lo* (translated here as the definite determiner *the*; see footnote 1 in Chapter 5).

- (40) a. Jose admiró lo alto que es el edificio.  
Jose admired the tall.MS.SG that is the building.MS.SG  
'Jose admired how tall the building is'

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<sup>7</sup>But this is not the only interpretation; see Chapter 4 for full discussion.

- b. Jose no entendió lo hermosa que era la novela  
 Jose not understood the beautiful.FM.SG that was the novel.FM.SG  
 ‘Jose did not understand how beautiful the novel was’

Intuitively, the examples in (40) are not about amounts, but about degrees or extents.<sup>8</sup> These relative clauses also have counterparts with *wh*-pronouns that are semantically equivalent.

- (41) a. Jose admiró cuán alto es el edificio.  
 Jose admired how tall.MS.SG is the building.MS.SG
- b. Jose no entendió cuán hermosa era la novela  
 Jose not understood how beautiful.FM.SG was the novel.FM.SG

In Chapter 5 I argue that Degree Neuter Relatives are in fact a subtype of AR.

### 1.4.3 The analytical puzzle

Identifying the locus of the difference between English-like and Spanish-like languages is only the beginning. If we concede, following previous accounts of English ARs, that the embedded CP is interpreted as a property of degrees, the question arises as to how to continue from the CP level on. If the CP is degree-denoting, the CP and the head-noun cannot be analyzed in terms of intersective properties: 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. The more pressing issue we face is whether the corresponding DP (e.g. *the books that Tolstoy wrote*) should be taken to denote an individual (of type  $e$ ) or a degree (of type  $d$ ). Both routes have been explored in the literature, and so I briefly comment on each of them below.<sup>9</sup>

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<sup>8</sup>Sometimes I will refer to sentences like (40) as having DEGREE interpretations rather than AMOUNT interpretations. This is done for clarity alone; after all, in the degree semantics assumed in this dissertation, amounts are but one of many degree expressions.

<sup>9</sup>To be sure, these problems have been discussed in the literature in the context of English ARs. In my view, however, this puzzle only arises in Spanish; see §1.3.3.

### 1.4.3.1 ARs denote individuals

The first option involves developing a structure where the head of the relative clause is interpreted twice, inside and outside the relative clause. Take (24) again.

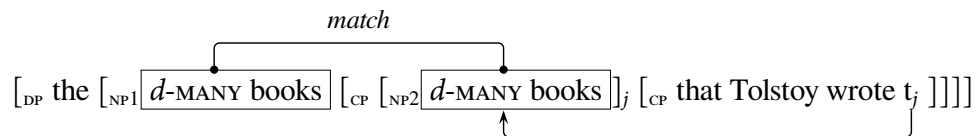
(24) Pedro ha escrito los libros que Tolstoy escribió.

Pedro AUX written the books that wrote Tolstoy

‘Pedro has written *the amount of* books that Tolstoy wrote.’

In order to express the AMOUNT interpretation of (24), we cannot simply appeal to a single instance of the noun *books* in the logical form, because the books that Pedro wrote and the books that Tolstoy wrote *are not the same*. One way around this is to adopt a matching structure for the relative clause (see Bhatt 2002, Sauerland 2004, Hulsey and Sauerland 2006).<sup>10</sup> For instance:

(42) **Logical Form of *e*-denoting ARs**



Consider now the interpretation of NP1:

(43) **Interpretation of NP1 in (42)**

$$\lambda y . books(y) \wedge |y| = \text{MAX}(\lambda d . \exists x[books(x) \wedge Tolstoy-wrote(x) \wedge |x| = d])$$

The biggest issue, from a semantic standpoint, is that the definite determiner cannot be interpreted. Were we to close the lambda abstract in (43) with an iota or epsilon operator—common denotations assumed for the definite determiner in Spanish—the resulting expression would denote a definite description entailing the existence of the books  $x$ , such that  $x$  is equal in cardinality to the number of books  $y$  that Tolstoy wrote. That this is problematic is easier to see with a slight variant of (24) above:

<sup>10</sup>The presentation here is an amalgam of ideas present in Carlson (1977a), Heim (1987) and von Stechow (1999).



(24) Pedro escribirá los libros que Tolstoy escribió.

Pedro write.FUT the books that wrote Tolstoy

‘Pedro will write *the amount of* books that Tolstoy wrote’

Here the books  $x$  equal in number to the books  $y$  that Tolstoy wrote need not exist; in fact, they should not exist, since this is not what AMOUNT interpretations are about. Moreover, there is no one single definite plurality of books  $x$  that Pedro will write: for the sentence to be true all it is required is that he writes *any* books in an amount equal to those written by Tolstoy, not just the particular books  $x$ . Different variants of this approach all lead to the same issue: if the final denotation of the AR is to be an individual and not a degree, the definite article cannot be interpreted. But, of course, this is quite mysterious given the fact that ARs *require* the definite article (see (7) above).

### 1.4.3.2 ARs denote degrees

The second option involves a derivation on which the full DP denotes a degree (Grosu and Landman 1998, Scontras 2017). Consider the syntactic structure below, in this case involving a raising analysis of relative clauses (e.g. Kayne 1994; Bianchi 1999 a.o.).

(44) **Logical Form of  $d$ -denoting ARs**

$$\llbracket_{\text{DP}} \text{the} \llbracket_{\text{NP}} \text{books} \rrbracket_j \llbracket_{\text{CP}} \llbracket_{\text{NP}} d\text{-MANY } t_j \rrbracket_i \text{ that Tolstoy wrote } t_i \rrbracket \rrbracket$$

In this case, we can interpret the definite determiner: it simply returns the greatest degree  $d$  such that Tolstoy wrote  $d$ -many books.

(45) **Interpretation of the DP in (44)**

$$\llbracket_{\text{DP}} \rrbracket = \text{MAX}(\lambda d . \exists x[\text{books}(x) \wedge \text{Tolstoy-wrote}(x) \wedge |x| = d])$$

The issue now is that we have to resolve the sortal mismatch between the resulting  $d$ -type object and verbs taking  $e$ -type arguments. As an illustration, I will describe the solution provided Grosu and Landman (1998) (for a different solution, see Scontras 2017). In essence,

the authors propose to reevaluate our conception of degrees. They suggest that degrees should not consist of particulars, but as bundles of information keeping track of what degrees are degrees of. They suggest that degrees are functions that take a plural individual  $X$  and map  $X$  to a tuple consisting of (i) a cardinality corresponding to  $X$ , (ii) a sortal predicate  $P$  that corresponds to what the degree is a degree of, and (iii) the plural individual  $X$ .

(46) **Structured degrees in Grosu and Landman (1998)**

For all plural individuals  $X$ :  $\text{DEGREE}_P(X) = \langle |X|, P, X \rangle$

Thus, under this conception, degrees are used to store information about the entity they are measuring. This allows the authors to define a function that “extracts” individuals from a degree denoting expression whenever necessary.

(47)  $\text{SUBSTANCE}(\text{MAX}(CP)) = \{x : \langle |x|, P, x \rangle \in \text{MAX}(CP)\}$

The operator  $\text{SUBSTANCE}$  is defined so that given a degree triple, it returns its third coordinate, the maximal individual. Applying  $\text{SUBSTANCE}$  to the meaning obtained in (45), we obtain a type  $e$  element, thus resolving the sortal mismatch and making it possible for the AR to combine with regular verbal predicates. Grosu and Landman (1998) develop this analysis as a general theory of relativization in natural languages. Thus,  $\text{SUBSTANCE}$  is designed so that it derives the ordinary  $\text{OBJECT}$  (intersective) interpretation of relative clauses.

The issue in this case is that we cannot have our cake and eat it too: the desired  $\text{AMOUNT}$  interpretation rests on not applying  $\text{SUBSTANCE}$ , but if so the semantic sortal mismatch is left unresolved. If, instead, we apply  $\text{SUBSTANCE}$ , we solve the sortal mismatch by providing an  $e$ -type denotation to the relative clause, but at the expense of losing the  $\text{AMOUNT}$  interpretation for an  $\text{OBJECT}$  interpretation. The conundrum is that we need to apply  $\text{SUBSTANCE}$  (for solving the sortal mismatch) but at the same time we cannot apply it (for thus we would lose the  $\text{AMOUNT}$  interpretation).

In sum, the analytical puzzles that we face have to do with the division of labor among the different pieces that participate in AMOUNT interpretations of relative clauses. The formal difficulties in accounting for the three main properties of AMOUNT interpretations in (14) above—*definiteness* of a degree, *indefiniteness* of the nominal in head position and *identity*—are reflective of a more general question: do relative clauses with AMOUNT interpretations denote individuals or degrees? The answer in this dissertation is that the underlying semantic nature of these ARs is language—or construction—dependent. Thus, two solutions are offered: the first, which accounts for the English ARs discussed here, is the object of Chapter 2. The second solution, based off of (certain) Spanish ARs, is offered in Chapters 4, 3 and 5.

## **1.5 Overview of the dissertation**

### **1.5.1 Main claims**

The main contribution of this dissertation is to demonstrate that natural language allows for at least two different means of conveying AMOUNT interpretations with relative clauses. Languages like Spanish make use of dedicated Amount Constructions, whereas those like English, lacking such constructions, arrive at AMOUNT readings via a more general KIND reading. A secondary goal is to address non-uniformity within a single language. I will argue that all three Spanish constructions in §1.4.2 are related and constitute minimal variations over a natural class of relative clauses. Specifically, all are genuine degree constructions, which involve syntactic and interpretive means ear-marked for constructing degree or amount expressions.

As it was pointed out earlier, previous research considered ARs only through the lens of degree semantics. In this respect, this dissertation makes two new contributions. First, it provides a new solution to the analytical puzzle described in (1.4.3). Second, it shows that taking ARs to be degree expressions is a language and construction dependent consideration, and it does not apply to all AMOUNT interpretations we may encounter across the board. That

is to say that, although previous research was right in pointing to degree-based analyses of AMOUNT interpretations, these should apply to languages like Spanish, but not English.

### 1.5.2 Summary of chapters

- **Chapter 2** In this chapter I offer a new perspective on AMOUNT interpretations of relative clauses in English that does not appeal to degree semantics. I defend the idea that in English AMOUNT interpretations are in fact a sub-case of a more general KIND interpretation. I show that such an analysis is desirable for two reasons: (i) to account for the fact that whenever an AMOUNT reading is available, so is a KIND reading, and (ii) to account for the fact that these constructions do not show any of the hallmarks of ordinary degree constructions.
- **Chapter 3** This chapter and subsequent ones discuss Spanish. In this chapter, the goal is to show that Spanish truly possesses a mechanism to deliver amounts that is absent in English. The source of the difference between the two languages lies in the ability of Spanish to construct relative clauses that denote definite descriptions of degrees (or maximized sets of degrees), that can in turn be used to build Measure Phrases.
- **Chapter 4** This chapter turns to propositional ARs. It is argued that these constructions have the external distribution and show syntactic properties of *wh*-constructions, like subordinate questions and exclamatives. I defend a syntactic analysis that accounts for the “hybrid” nature of these propositional relatives by treating them as involving an interrogative core and a nominal functional layer above this interrogative CP. This syntactic proposal is supplemented by a compositional semantic analysis of the structure. The structure of these propositional ARs differs only minimally from those of nominal ARs, making the two constructions related in ways reminiscent of the more familiar parallels between interrogatives and free relatives.

- **Chapter 5** The last chapter provides an analysis of Degree Neuter Relatives as a kind of ARs, and show that they, too, come in two varieties. The analyses proposed for propositional and nominal ARs in the previous chapters is shown to extend straightforwardly to account for Degree Neuter Relatives in the two environments in which we find them.

## CHAPTER 2

### THE ROAD TO AMOUNTS THROUGH KINDS

Previous analyses of ARs, in some way or other, have looked at this construction through the lens of degree semantics. The goal of this chapter is to present an analysis of these constructions that does not appeal to degree semantics. Instead, I will defend an analysis of so-called ARs in English where they are understood as a sub-case of a more general KIND interpretation. I show that such an analysis is desirable for two reasons: (i) to account for the fact that whenever an AMOUNT reading is available, so is a KIND reading, and (ii) to account for the fact that these constructions do not show any of the hallmarks of *bona fide* degree constructions. Thus, the defended analysis is not only more parsimonious, but it is also empirically more adequate.

#### 2.1 A new perspective

Though the theoretical discussion of ARs began with an exploration of English ARs, English relative clauses are much more restricted in when they allow AMOUNT readings. As it was pointed out in the introduction (see §1.4.2), besides disallowing AMOUNT interpretations in embedded positions altogether, English speakers do not readily access AMOUNT readings in many unembedded environments, either. But, in any case, we are tasked with providing an explanation for the fact that English relatives *can* give rise to AMOUNT interpretations in at least some cases. How do these come about? This chapter offers a novel perspective on this problem and on ARs generally, where they are not “ARs” in the technical sense at all (i.e. they do not appeal to degree semantics; Heim 1987, von Stechow 1999, etc.). Rather, they

involve a kind-referring head noun and a relative clause that identifies some relevant property possessed by the kind, which may very well be “being of a certain amount or quantity”.

Though the author did not discuss it in much detail, Carlson (1977a) had already observed that relative clauses that have AMOUNT interpretations in English also have KIND readings. My goal is to pursue a unification of these two readings. While there have been attempts to unify the semantics of kinds and degrees/amounts (Anderson and Morzycki 2015, Scontras 2017), the hypothesis that I am exploring takes this reductionist agenda further: AMOUNT interpretations of ARs are a form of kind interpretation. Consequently, whenever a relative clause admits an AMOUNT interpretation it also necessarily allows a KIND interpretation. This hypothesis is spelled by the following generalization.<sup>1</sup>

(1) The AMOUNT  $\subseteq$  KIND generalization:

Amount interpretations of relative clauses are parasitic on kind readings.

The general intuition is, in a nutshell, that KIND readings of relative clauses highlight some relevant property that holds of the referent of the relative clause, which may well be about an amount.

(2) a. It would take us years to drink the champagne that we spilled last night.

$\leadsto$  It would take us years to drink champagne with some relevant property of the champagne we spilled last night

b. the champagne that we spilled last night  $\leftrightarrow$  champagne with property  $\mathbb{P}$

[where “the champagne that we spilled last night” is a realization of  $\mathbb{P}$ ]

For the moment, interpret the squiggly double arrow “ $\leftrightarrow$ ” in (2b) as “somehow conveys”.

The absence of the definite article in the paraphrase is intentional: AMOUNT interpretations of ARs have existential import, as we will see shortly (see Scontras 2017). For the moment

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<sup>1</sup>It is important not interpret this relation as a biconditional; it may very well be that sometimes only kind readings are possible. Why this should be the case is a question that I leave open for future research.

what counts as the relevant property  $\mathbb{P}$  is left unspecified, it can be any property, including both gradable properties like *be d-dry* as well as non-gradable properties, like *be produced in Alsace*.

To show that in English AMOUNT interpretations of relative clauses are in fact KIND interpretations I build the argument in three steps. First I show that KIND readings and AMOUNT interpretations share a number of properties. Then I show that these commonalities extend to the behavior of the nouns *kind* and *amount* as well. Finally I show that so-called ARs are not subject to the same constraints that affect other run-of-the-mill degree constructions.

## 2.2 The KIND-AMOUNT connection

Carlson (1977a,b) originally observed that there seems to be a connection between KIND and AMOUNT interpretations. In short, he noted that relative clauses with AMOUNT interpretations in English may also have KIND interpretations. The preference in the literature to use degree semantics to analyze ARs has somewhat hidden this connection, however.<sup>2</sup> Thus, in what follows I provide a number of observations supporting the similarities between AMOUNT and KIND interpretations.

### 2.2.1 Context dependency

Generally, a sentence that gives rise to an AMOUNT interpretation can also have a KIND reading. Contextual and lexical factors can favor one reading or other, either by manipulating the context or by small changes in the sentence (e.g. picking lexical verbs that favor one reading for independent world-knowledge related reasons). Consider:

#### (3) Context manipulation

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

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<sup>2</sup>In recent work, Anderson and Morzycki (2015) and Scontras (2017) have provided new conceptions of degrees that bring them closer to kinds. While this may be a good thing at the end of the day, my goal here is simply to show that we can reduce AMOUNT interpretations to KINDS without having to worry about the ontology of degrees.



b. AMOUNT:

We are fighting against the Imperial Army, who have a massive army, and they always bring many more soldiers than we do to the battlefield.

c. KIND:

The Imperial Army has some soldiers that are {good/big/well trained} and although we have more soldiers, they always win.

The context in (3b) facilitates the AMOUNT interpretation of (3a). But (3a) is felicitous and true if it were uttered in a context like (3c). In this case, what the sentence conveys is not that the Imperial Army possessed more soldiers than us, but that they did possess soldiers with some other relevant quality.

Herdan (2008), a defender of the degree abstraction approach, explicitly argues against this extreme context dependency. She points out that adjusting the context is not always sufficient to switch from an AMOUNT to a KIND reading. The evidence she presents is reported below.

(4) Last night I was in my cellar deciding which of the many fine wines to drink. In the end, I drank in one hour the wine that Marv can drink in one day.

↪ *I drank in one hour as fine a wine as Marv can drink in one day.*

The underlined sentence contains a relative clause that cannot be true of different degrees of wine quality. This much is true. The context provided by the author, however, is not very conducive to a non-AMOUNT interpretation. Notice that the combination of a verb like *drink* with temporal PPs suggests quite strongly a *how much you can drink in x time* type of reading. Thus, by “context” we cannot mean simply “linguistic context”, for merely mentioning a possible property that the champagne may have had does not suffice to arrive at the relevant interpretation. Instead, the role of the contextual manipulation must be to add plausibility to the intended interpretation. Moreover, since it is context-dependency that is a stake, what we have to show is that the relevant reading is present in those contexts that do facilitate it.

Showing that there are contexts where the relevant interpretation is *absent* teaches us little about the distribution of AMOUNT interpretations with relative clauses. With these considerations in mind, let us give another try to examples similar to (4). Below are two examples where the KIND, quality-oriented reading of the relative clause is possible even with temporal modifiers. Take a chess problem solving contest, where what matters is the difficulty of the problems and the time it takes to solve them. In this situation, (5a) reports that I could not solve in one hour problems as difficult as the one that Marv solved in just 30 minutes. Similar observations hold of (5b) as well.

(5) a. I didn't solve in one hour the chess problems that Marv solved in 30'.

b. I couldn't run in one hour the trails that Marv runs in 30'.

In addition to simple contextual manipulations, lexical changes can also flip the bias towards one or other interpretation. Thus, from Heim's (1987) classical example, Anderson and Morzycki (2015) give us (6a), where the KIND interpretation is much more salient.

#### (6) **Lexical manipulation**

a. KIND:

It will take us the rest of our lives to **find** the champagne that they had that evening

b. AMOUNT:

It will take us the rest of our lives to **drink** the champagne that they had that evening.

Here again the source of the difference in accessibility of the two readings also comes down to plausibility. Whereas drinking a particular kind of champagne is not obviously a task of considerable difficulty, finding a particular kind—if it were rare enough—may be.

### 2.2.2 AMOUNT interpretations without relative clauses

AMOUNT interpretations, just like KIND interpretations, do not necessarily rely on the presence of a relative clause. That is, provided that we have enough contextual support, the relative

clause might be dropped altogether. The examples in (7) show that both **AMOUNT** and **KIND** interpretations are possible with nouns modified by PPs.

(7) **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 (7b) 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. Similar interpretations are available for (8b) as well, with bare DPs.

(8) **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 require a degree variable originating in a subordinate position.

### 2.2.3 The role of the definite article

**KIND** and **AMOUNT** interpretations are also related by the fact that they involve definite articles that fail to do their usual job. Notice that neither sentence in (9) is about some definite object-level champagne. That is, when we are talking about *kinds of* champagne or about *amounts of* champagne, we are not referring to any particular instance of champagne.

- (9) a. **KIND**: ...to find (\*the) [champagne of the kind that we spilled last night]  
b. **AMOUNT**: ...to drink (\*the) [champagne in the amount that we spilled last night]

What these sentences convey is an existential statement, namely, that there is some champagne of some kind or in some amount such that we spilled that kind/amount of champagne.

The definiteness is therefore not about the champagne, but about a kind or an amount. The following paraphrases are more explicit about this.

- (10) a. KIND: ...to find *the* kind of champagne of that we spilled.  
b. AMOUNT: ...to drink *the* amount of champagne that we spilled.

- (11) a. KIND: ...to find *that* kind.  
b. AMOUNT: ...to drink *that* amount of champagne.

This type of interpretation seems to be a particularity of the definite article. In fact, as Carlson (1977a) and Grosu and Landman (1998) noted, the definite article seems to be necessary in all these examples.

- (12) a. KIND:  
It will take us the rest of our lives to find {the / \*a / \*some / \*few / \*two} champagne that there was at the party that evening.  
b. AMOUNT:  
It will take us the rest of our lives to drink {the / \*a / \*some / \*few / \*two} champagne that there was at the party that evening.

In addition, these readings are generally incompatible with the complementizer *which*, as demonstrated by (13).

- (13) a. KIND:  
It will take us the rest of our lives to find the champagne {that /  $\emptyset$  / \*which} there was at the party.  
b. AMOUNT:  
It will take us the rest of our lives to drink the champagne {that /  $\emptyset$  / \*which} there was at the party.

#### 2.2.4 A connection with exclamatives

Relative clauses are not the only construction where it is possible to get both KIND and AMOUNT interpretations: it is also present in nominal exclamatives, which are superficially identical to restrictive relative clauses. This is true of matrix as well as subordinate exclamatives.

(14) a. It's amazing the cars he owns.

b. The cars he owns!

(15) a. KIND: what's remarkable/surprising is the kinds of cars he owns.

b. AMOUNT: what's remarkable/surprising is how many cars he owns.

For completeness, notice that the same syntactic constraints we saw above with relative clauses apply to these exclamatives.

(16) a. \*It's amazing {some / few / many} cars he owns!

b. \*{Some / Few / Many} cars he owns!

(17) a. \*It's amazing the cars {that /  $\emptyset$  / #which} he owns!

b. \*The cars {that /  $\emptyset$  / #which} he owns!

#### 2.2.5 Wrap-up

The similarities between KIND and AMOUNT interpretations of relative clauses suggest that a satisfactory analysis should be able to account for the observed correspondence between the availability of the two types of interpretation. It is a more parsimonious perspective and we would otherwise lose a robust generalization.<sup>3</sup> The next step is to explore some corollaries of

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<sup>3</sup>Bear in mind that one could still maintain that only the AMOUNT reading requires a special treatment, and the rest of the readings are just interpretations allowed by the definite article. The fact that AMOUNT interpretations require the definite article makes this claim hard to disprove, and I will not consider it.

the generalization in (1). First, if AMOUNT readings are really parasitic on KIND interpretations, no relative clause that permits AMOUNT readings should do so to the exclusion of a KIND reading. Second, if AMOUNT interpretations are reducible to KIND interpretations in some capacity, we should not be surprised to observe similarities in the behavior of the nouns *kind* and *amount*. And third, since KIND readings do not involve degree abstraction and are not subject to the same syntactic and semantic restrictions that degree constructions are, it is predicted that relative clauses with AMOUNT interpretations do not show any of the hallmarks of degree abstraction. I examine these questions in turn.

### 2.3 Distribution of the nouns *amount* and *kind*

If KIND and AMOUNT readings of relative clauses are related in any way, we should not be surprised to find similarities between the semantic behavior of the nouns *kind* and *amount* when they appear in constructions like *the kind/amount of*. Below I provide six arguments in favor of this connection.

**Argument 1** Both nouns only allow existential readings when they appear with demonstrative pronouns like *this* and *that*. The examples below show that both nouns are unable to refer to particular objects (but see Scontras 2017 for a contrary opinion about *amount* and footnote 5 for discussion).

(18) I want [that amount of apples].

- a. ✗OBJECT: I want [those apples there (pointing at them)]
- b. ✓AMOUNT: I want [apples in the indicated amount]

(19) I want [that kind of apples].

- a. ✗OBJECT: I want [those apples there (pointing at them)]
- b. ✓KIND: I want [apples of the indicated kind]

**Argument 2** Both nouns impose constraints on how they refer to kinds (Carlson 1977a, p.212). For example, the noun *kind* can be used to talk about different subkinds, as in *two kinds of dogs*, which refers to two different subkinds of dogs, like bull-dogs and beagles. However, when used this way (typically as the restrictor of some quantifier), *kind* can only refer to subkinds whose realizations are disjoint. As an example, consider (20) below. Fido is a border collie (a kind of dog) and a watch-dog (another kind of dog). And yet (20) cannot be used to describe a situation as in (20b) where only Fido is sitting in the next room, despite the fact that Fido instantiates both subkinds in the real world. From this Carlson concludes that using the noun *kind* to quantify or count subkinds requires that the objects that instantiate these subkinds be disjoint.

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

- a. ✓ There are three bull-dogs and two beagles.
- b. ✗ There is only Fido, who is a border collie and a watch-dog.

Similar observations hold of nouns like *amount* and *quantity* (see Scontras 2017 as well). Some speakers accept expressions like *amounts of apples*—or perhaps *quantities of apples*—in (21) to mean that there are two different quantities of apples on the table, e.g., one weighing two kilos and another one weighing four. However, take a situation now where there is a single pile of apples whose amount has been determined by weight (three kilos of apples) and by numbering the apples (twelve apples). Just like in (20) above, (21) cannot be used to refer to these two these two amounts (three kilos and twelve in number), even though the pile of apples on the table is both an amount of three kilos of apples and an amount of twelve apples.

- (21) 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 (21b) to the same reason that Carlson proposed for (20) above: when we reference to amounts, each object can only be counted/measured once.

**Argument 3** Carlson (1977b) noted that pseudo-partitive constructions with measure nouns have the ability to relativize, be questioned and pronominalize. The following are his examples:

(22) **Pseudo-partitives**

- a. Those are the beans that Bob ate three {pounds / bags} of.
- b. What did Bill see two {pounds / bags} of?
- c. Bob saw three {pounds / bags} of {them / it} yesterday.

The nouns *kind* and *amount* can also be used to form kind- and amount-referring expressions in a similar syntactic frame as pseudo-partitives. However, as Carlson (1977b, p.341) showed, *kind of* constructions differ from examples like (22) in their ability to allow these three syntactic operations.

(23) **Kind nouns**

- a. ??Those are the beans that Bob ate three kinds of.
- b. ??What did Bill see two kinds of?
- c. ??Bob saw three kinds of {them / it} yesterday.



*Amount of* constructions show the same patterns as *kind of* constructions in disallowing these operations (Scontras 2017).<sup>4</sup>

(24) **Amount nouns**

- a. ??Those are the beans that Bob ate three {amounts/quantities} of.
- b. ??What did Bill see two {amounts/quantities} of?
- c. ??Bob saw three {amounts/quantities} of {them / it} yesterday.

**Argument 4** The two nouns behave alike in contexts that typically induce Definiteness Effects. As originally pointed out by Milsark (1974), *there-be* existential constructions in English seem to be reserved for indefinites, bare plurals and other weak DPs. But unlike ordinary definite DPs, definites with the nouns *kind* and *amount* are allowed in this position.

(25) a. \*There are those {books / apples} in the library.

b. There are {books / apples} in the library.

(26) a. There are those kinds of books in the library.

b. There is that amount of apples in the kitchen.

**Argument 5** Both nouns are possible in superficially transitive and intransitive forms, with no apparent shift in meaning (Wilkinson 1995); compare to other pseudo-partitives in (29).

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<sup>4</sup>Barbara Partee (pc.) notes that the implausibility of (23) and (24), at least with respect to their ability to relativize and be questioned, might not be a formal anomaly. For instance, the following are much improved:

- (i) a. Which beverages does that place have the most kind of?  
b. What did he order small quantities of?
- (ii) a. That's the beverage that the store has three kinds of.  
b. That's the whiskey that she ordered small quantities of.
- (iii) He ordered small quantities/amounts of it/them every week.

It could be, then, that the apparent ungrammaticality of these constructions is simply a reflection of the difficulty to find appropriate contexts for them.

- (27) a. That kind of animal is sitting on my lawn.  
b. An animal of that kind is sitting on my lawn.
- (28) a. That amount of water is too much.  
b. Water in that amount is too much.
- (29) a. Those { bags / ?pounds } of potatoes are too much.  
b. \*Potatoes in those { bags / pounds } are too much.

**Argument 6** Another aspect where *amount* and *kind* nouns behave like indefinites is revealed by adverbs of quantification. Below both sentences in (30) are interpreted as involving quantification over times/situations.

- (30) a. Equations of that kind rarely have two different solutions.  
b. An equation of that kind rarely has two different solutions.

Wilkinson (1995) observes that the same is true of the intransitive variant of the noun *kind*. Despite being headed by a definite determiner, a demonstrative, (31) below has an identical interpretation to (30a) and (30b).

- (31) That kind of equation rarely has two different solutions.

As we have observed throughout this section, *amount* patterns once again like *kind* (Scontras 2014, 133), and both sentences below are interpreted alike.

- (32) a. That amount of apples rarely busts the bags.  
 b. Apples in that amount rarely bust the bags.

Summing up, there is an undeniable similarity between the syntactic and semantic behavior of the nouns *kind* and *amount*.<sup>5</sup> These similarities along with the fact that KIND and AMOUNT relatives show parallel behavior even in the absence of the relevant nouns, speaks in favor of an analysis of the two constructions where one is derived from the other.

## 2.4 Degree abstraction or lack of thereof

The evidence we have seen so far indicates a tight connection between the behavior of the nouns *kind* and *amount* and the availability of the corresponding interpretations with restrictive relative clauses. In this section I present arguments *against* a degree based approach for relative clauses with an AMOUNT reading, which makes an alternative, non-degree based analysis necessary. The alternative analysis presented below will capitalize on the similarities between *kind* and *amount* reference seen in the previous sections.

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<sup>5</sup>There is one place where a potential difference between the two words may arise. According to Scontras (2017), *amount* (also *quantity* but neither *number* nor *kind*) is able to refer to definite objects.

- |        |  |                                  |
|--------|--|----------------------------------|
| (i) a. | I want that {amount / quantity} of apples over there | ↷ <i>those particular apples</i> |
| b.     | #I want that number of apples over there             | ↷ <i>those particular apples</i> |
| c.     | #I want that kind of apple over there                | ↷ <i>those particular apples</i> |

I have some reservations about the availability of this interpretation for *amount*. Many of speakers I have consulted disagree with the judgment. Maybe the relevant reading requires an interpretation of *amount* more in the line with *pile* or perhaps *quantity*, which seem to allow definite readings more easily. I can think of two reasons why we might prefer not to allow definite readings of the noun *amount*. First, if *amount* can refer to definite objects, we lose an explanation for the ungrammaticality of examples like (24c) above, since nothing would preclude pronominals to refer back to that entity (but see footnote 4). Second, if *amount* were able to refer to definite objects rather than amounts, the following dialog would be predicted to be felicitous, contrary to intuitions.

- (ii) In the fruit store they have different containers as samples to illustrate how much fruit they can fit. I point at one of those sampling containers that is full of strawberries and I say: “I want that amount of strawberries”. The seller then proceeds to fill in an identical empty container with fresh strawberries and I complain: “Why are you doing that? I said I wanted THAT amount of strawberries.”

In this dialog, given my first utterance, I am not entitled to any complaint because the vendor could not possibly interpret *that amount of strawberries* as referring to any particular strawberries.

### 2.4.1 Contextual support

The first, perhaps on-the-surface fact that makes us question the presence of a degree operator is the observation that AMOUNT interpretations are accessible even in the absence of a relative clause (e.g., replaced by a PP or dropped altogether). This suggests that we need not depend on the presence of a degree operator in a subordinate CP position in order to get at the AMOUNT interpretation. The following examples are repeated from above.

(7a) We lost the battle because we didn't have the soldiers of the Imperial Army.

(8a) We lost the battle because we didn't have the soldiers.

### 2.4.2 Sub-deletion

The process known as sub-deletion is considered a hallmark of degree abstraction (Kennedy 1997, 2002). For instance, comparatives and equatives all allow sub-deletion.

(33) 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.

(34) 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.

(35) \*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 (35) points towards a fundamental difference in how the AMOUNT interpretations arise in (33) and (34a) on the one hand and ARs on the other.<sup>6</sup>

### 2.4.3 Islands

The last argument, the one that I find more compelling, 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 words and expressions that range over individual entities are good extractees, as opposed to words that range over other domains, like degrees, times, manners, etc., which often incur so-called island violations.

The form of the argument that I present here is the following. 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 our 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.

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<sup>6</sup>The contrasts above are damaging for degree based accounts in a variety of ways, depending on the particular implementation of each analysis. For instance, Scontras (2017) assumes a raising syntax for Classifier Relatives which, taking (34a) at face value, seems like a non-starter. But adopting a matching-style analysis without further ado would still not do, since then the impossibility of sub-deletion in (35) would remain unaccounted for. Grosu and Landman (2017), on the other hand, equate Classifier Relatives to pseudo-partitive constructions and only by adding some stipulations can they account for the contrast between (34a) and (34b).

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

- (36) 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, presupposes a maximal degree among all the degrees in the set that it ranges over (see definitions of MAX in §4.3.2.1 and §5.3.1). In the absence of such maximal degree, the expression is undefined, yielding ungrammaticality (in the sense of Gajewski 2002; see Abrusán 2014 and Rett 2015 for discussion). Thus, in the examples above, there is no maximal number of soldiers that the Imperial Army did not have, since presumably that number is infinite, and thus the result of the maximalization operation is undefined.

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

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

Now, if we look at relative clauses with AMOUNT interpretations, we observe that they pattern like (37) and unlike the examples in (36) above. Many speakers admit an AMOUNT reading of (38) without further ado: it amounts to saying that our soldiers exceeded in number those of the Imperial Army. (Out of the blue, the KIND interpretation of (38) is also available.)

(38) 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, (39) expresses that we had an amount of students such that your school did not have as many students.

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

#### 2.4.3.2 Tenseless *wh*-islands

The case of tenseless *wh*-islands presents a similar contrast in English. 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.)

- (40) 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 (40a) as well.

- (41) a. \*We hired more soldiers than you wondered whether to hire to fight Imperial Army.  
b. \*We hired as many soldiers as you wondered whether to hire to fight Imperial Army.

In contrast with (40a) and (41), the relative clause in (42) 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, (42) is true and felicitous.

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

### 2.4.3.3 Presuppositional islands

Presuppositional islands are induced by extracting material out of linguistic contexts that carry some kind of presupposition. There are various types of presuppositional islands, and we will review three here. 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:

- (43) a. To whom do you regret having shown this letter?  
b. \*From whom do you regret having gotten this letter?

Different accounts offer different perspectives as to why and how this should be the case, but for our purposes we can assume the following simplified picture. The culprit of the ill-formedness of (43b) is the presupposition of the verb *regret*, where *x regrets that p* presupposes that *x believes that p*. Following the characterization in Abrusán (2014), a question like (43a) presupposes that you have shown the letter to the relevant number of people in the domain. That is, the presupposition of *regret* is argued to project *universally*: for every *x* in the given domain, the speaker believes you have shown the letter to *x*. This presupposition is unproblematic. However, (43b) will likewise presuppose that you have gotten this letter from a



number of people, and this presupposition cannot ever be met by one-time-only predicates.<sup>7</sup> With this general schema in mind, we can now look into particular cases.

**2.4.3.3.1 Factive verbs** Factive islands are created by factive (negative) predicates like *regret*, as in (43) above (Szabolcsi and Zwarts 1993). Under a classical approach to degree questions (e.g. von Stechow 1984), a question like (44a) is interpreted as *For what degree d did John regret that he spilled d-much wine at the party?* If *regret* projects its presupposition universally, (44a) should presuppose that John believes that he spilled an infinite amount of wine: *for every degree d, John believes that the amount of wine that he spilled is at least d.* This corresponds to the maximal degree in the scale, which in this case is undefined.

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.<sup>8</sup> However, in the case of identity questions like (44b), no such infelicity arises: the presupposition of (44b) simply states that John has spilled a number of things at the party (and that he believes so).

- (44) 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 (44a) is related to the presence of degrees is confirmed by the ill-formedness of (45), with a comparative and an equative construction.

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<sup>7</sup>This is, in a nutshell, Abrusán's (2014) theory of presuppositional islands created by degree extraction as well: the resulting expressions carry a presupposition that is contradictory, and so no context will be able to satisfy it.

<sup>8</sup>This is in fact one of the main criticisms by Fox and Hackl (2007) and Abrusán (2014) to classical approaches to degree questions, since the prediction is that degree questions should be felicitous with closed scale adjectives, contrary to fact: \**How empty did John discover that his account was?* Solutions to the puzzle include the proposal that all scales that natural grammar employs are dense (Fox and Hackl 2007) or some version of the interval theory of degrees (Schwarzschild and Wilkinson 2002, Heim 2006).

- (45) 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 is not true of relative clauses: AMOUNT readings of sentences like (46) 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 (46a) can try (46b) instead.

- (46) 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.

**2.4.3.3.2 Other factives** Honcoop (1998) observed that certain factive nouns and adjectives that take propositional complements also induce weak islands. For instance, while the noun *surprise* in a construction like *it was a surprise that p* presupposes that (the speaker believes that *p*, adjectives like *possible* do not. Correspondingly, only *surprise*-type nouns induce weak islands. Below the contrast is illustrated with the adjective *scandalous* and the noun *possible*.

- (47) a. \*How much whiskey was it scandalous that John drank at the age of 16?  
 b. How much whiskey is it possible that John drank at the age of 16?

As expected, weak islands can be obviated by extracting entity denoting *wh*-words instead of *wh*-words ranging over degrees, as witnessed by the contrast between (47a) and (48) below.

- (48) What was it scandalous that John drank at the age of 16?

Looking at the comparative and equative counterparts of (47a), we observe that the same kind of contrast is reproduced here as well. Extraction out of comparatives and equatives is also banned with *surprise*-type nouns, but not so with *possible*-type ones.

- (49) a. ??We drank more whiskey than it was scandalous that John drank at the age of 16.  
 b. ??We drank as much whiskey as it was scandalous that John drank at the age of 16.
- (50) a. We drank more whiskey than it is possible that John drank at the age of 16.  
 b. We drank as much whiskey as it is possible that John drank at the age of 16.

In contrast, (51) demonstrates that the AMOUNT reading of a relative clause is retained in those environments where genuine degree constructions are ill-formed. The sentences below may be used to express that what we drank is the amount of whiskey such that it was scandalous that John would drink that amount of whiskey at the age of 16.

- (51) a. We drank the whiskey that it was scandalous that John drank at the age of 16.  
 b. We can easily drink the whiskey that it was scandalous that John drank at the age of 16.

**2.4.3.3.3 Response stance verbs** Response stance verbs like *deny*, *verify*, *admit*, etc. are presuppositional in the sense that they “presuppose that their complements express assumptions or claims held by someone possibly other than the speaker which are part of the common ground” (Honcoop 1998, 167). In the case of *deny*, *x denied that p* presupposes that *it is assumed by someone that p*. The presuppositional status of this family of verbs is not as clear cut as that of factives, and in fact for many speakers there is little—if any—contrast between the two examples in (52) below.

- (52) a. \*How much wine has John denied that he spilled at the party?  
 b. What does John deny that he spilled at the party?

For those speakers that are not so willing to accept island violations like (52a) with *deny*, however, the same contrasts can be reproduced by looking a comparatives/equatives on the one hand and relative clauses with AMOUNT interpretations on the other.

- (53) a. \*We drank more wine than John denied that he spilled at the party.  
b. \*We drank as much wine as John denied that he spilled at the party.
- (54) We drank the wine that John denied that he spilled at the party.

#### 2.4.4 Interim summary and conclusion

We have shown that the connection between KIND and AMOUNT interpretations is quite pervasive. Moreover, we have seen that there are reasons to cast doubt on the presence of degree abstraction in relative clauses, even when they permit an AMOUNT interpretation. Coupled together, these two facts suggest that subsuming AMOUNT interpretations under KIND interpretations is not only defensible, but desirable.

The rest of the chapter is devoted to spell out this intuition in concrete terms. First, I show that amount and (sub)kinds share sufficient structural properties so as to understand the former in terms of the latter. Then, I show what it means to be a subkind and why the relative clause is critical. Finally, I provide a compositional analysis of subkind predication that taken in tandem with the previous conclusions, accounts for AMOUNT interpretations of English relative clauses.

### 2.5 Getting from kinds to amounts

We started off the chapter by providing an intuitive paraphrase of AMOUNT readings of relative clauses that reflected the fact, extensively discussed in the previous sections, that relative clauses that allow AMOUNT interpretations also allow KIND interpretations. Here it is repeated again:

- (2) a. It would take us years to drink the champagne that we spilled last night.  
    ~> It would take us years to drink champagne with some relevant property of the champagne we spilled last night



- (56) a. (#The) lions are widespread.  
b. (#The) whales are extinct.

However, there are specific environments where the definite article can be used to make reference to a kind. Consider (57), where a kind-referring term is further restricted by the use of an anaphoric demonstrative or a relative clause.

(57) **Basic paradigm with *kind*** [based on Zamparelli (1998)]

- a. *Anaphoric demonstratives*
- i. This kind of lion is widespread.
  - ii. This kind of whale is extinct.
- b. *Relative clauses*
- i. The kind of lion that eats people is widespread.
  - ii. The kind of whale that had horns is extinct.

The pattern is the same even when the head noun *kind* is dropped, suggesting that the definite article is not altogether ruled out in bare kind-referring terms.

(58) **Reduced paradigm without *kind***

- a. *Plural anaphoric demonstratives*
- i. These lions are widespread.
  - ii. These whales are extinct.
- b. *Relative clauses*
- i. The lions that eat people are widespread.
  - ii. The whales that had horns are extinct.

- 
- (i) a. Unlike other types of big cats, (the) lions come in several varieties.  
b. (The) dinosaurs became extinct at various points in time.

[Barbara Partee, pc.]

[Dayal 2004]

Crucially, (57) and (58) refer to subkinds of lions and whales, as opposed to the natural kinds on the whole.<sup>10</sup> Moreover, subkind-referring expressions like those in (57) and (58) need not be natural or well-established; they can be *ad-hoc*. This is easily seen in (58b): the lions that eat people, for instance, do not form a natural class; in fact, they may comprise of individual lions in several subspecies of lion and exclude others in the same subspecies.

Chierchia (1998b, 348) thought of kinds as regularities that occur in nature, whose only property is that “we can impute to them a sufficiently regular behavior”. *Ad hoc* subkinds allow us to do something similar in real time, that is, impute a regular behavior to some subset of a kind without prior agreement as to whether the behavior in question actually qualifies as sufficiently regular. This is a very useful mechanism if, with Chierchia (1998b), we believe that what counts as kind is not set by the grammar, but amounts instead to conventional (shared) knowledge of a community of speakers. It allows us to talk and ask questions about very specific kinds. As an illustration, the following examples were retrieved from the internet.

- (59) a. Are you the kind of student who relishes an academic challenge, is intellectually curious, seeks out opportunities to help others, and wants to lead others to impact change in your local community, our environment and the world?
- 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.

To summarize, we saw that while simple definite descriptions (without the noun *kind*) do not generally make good kind-referring terms in English, they can be used to pick out salient subkinds in certain restricted contexts. Moreover, these subkinds may be *ad hoc*. Thus, we need two things to form an *ad hoc* subkind: (i) a semantic sortal—something to be a kind of—, and (ii) some means to identify what the relevant subkind is. (i) is provided by a kind-

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<sup>10</sup>I am assuming no ontological difference between kinds and subkinds. 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”. Given the difficulties to define the notion of being “well established”, I will not assume such distinction. (Simply saying that it amounts to a taxonomic distinction won’t do; for discussion, see Chierchia (1998b).)

referring noun. Anaphoric demonstratives, relative clauses (and sometimes PPs and other modifiers like adjectives) can accomplish (ii).

The analysis I defend here capitalizes on the possibility of constructing *ad hoc* subkinds and the grammaticality of the definite article when making reference to such subkinds. Before turning to this analysis, however, we must discuss a restriction on forming subkinds.

### 2.5.1.2 The disjointness condition

Forming subkinds, *ad hoc* or not, is not completely free. Carlson (1977a) noted that when referring to different subkinds, the subkinds must be disjoint, they cannot share realizations. We saw this before: a sentence like (20), repeated below, cannot be verified by a situation where only Fido is sitting in the next room, even though Fido in fact belongs to more than one kind of dog (assume that he is a watch dog and a border collie in the real world, thus effectively belonging to these two different subkinds of dogs).

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

Carlson (1977b) spelled out the constraint as follows (adapted from Carlson 1977b, 213):

(60) 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.

This condition is fundamental in understanding how AMOUNT interpretations can arise *qua ad hoc* subkinds, and will be discussed in further detail below.

### 2.5.2 What amounts and kinds have in common

In order to make the connection between *ad hoc* subkinds and AMOUNT interpretations maximally salient, I will recast Carlson's (1977b) disjointness condition in terms of partitions.



More specifically, reference to subkinds must be mediated by an equivalence relation that induces a partition on the denotation of its relevant superkind. How this equivalence relation is determined is context dependent; as a consequence, part of the task when interpreting an *ad hoc* subkind 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 of my height can be defined by the set of all people who 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* subkinds involves figuring out what the equivalence relations is, and because some equivalence relations can serve to define degrees, there is no reason why *ad hoc* subkinds should not make reference to portions of equal amounts, just like the refer to sets of entities. Coming back to the example in (2) above, we could say that the equivalence relation *be the same kind as* would give us a partition of champagne individuals 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.

### **2.5.2.1 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.

(61) **Relations:** Let  $A$  be a non-empty set and  $R$  a relation in  $A$ . Then:

- a.  $R$  is *reflexive* iff  $\forall a \in A [R(a, a)]$
- b.  $R$  is *symmetric* iff  $\forall a, b \in A [R(a, b) \rightarrow R(b, a)]$
- c.  $R$  is *transitive* iff  $\forall a, b, c \in A [R(a, b) \wedge R(b, c) \rightarrow R(a, c)]$

For instance, the equivalence relation *be as old as* holds of all twins, but it does not hold of any parent–child pairs.

(62) *Equivalence Relation:* Let  $R$  be an equivalence relation. Then:

$$a \simeq_R b \text{ iff } \forall x [(R(a, x) \leftrightarrow R(b, x)) \wedge (R(x, a) \leftrightarrow R(x, b))]$$

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.

(63) *Equivalence Class:* Let  $[ ]_R$  be a function from a domain  $D$  to  $POW(D)$  such that:

$$\forall x \in D [[x]_R = \{y : y \in D \wedge x \simeq_R y\}]$$

If  $R$  is an equivalence relation,  $[x]_R$  represents the equivalence class containing  $x$ . Thus, if  $y$  is also a member of  $[x]_R$ , then  $[x]_R = [y]_R$ . Equivalence relations are useful for us because they can induce a *partition*.

(64) *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  $Y$ ,  $X \cap Y = \emptyset$  and (ii) the union of all subsets of  $A$  equals  $A$ .

Each subset that is a member of some partition is called a *cell*. An equivalence relation  $R$  is able to induce a partition on a set  $A$ , because 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. Thus, a partition is simply a collection of all equivalence classes arising from some equivalence relation.

(65) *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 (20). Given the equivalence relation *be the same breed as*, Fido is a member of the cell containing border collies, the equivalence class  $[F]_{\text{breed}}$ . By the same token, if the equivalence relation were *have the same role as*, Fido would be in the cell containing watch dogs,  $[F]_{\text{role}}$ . Given the properties of partitions, Fido cannot live in two cells at the same time, and so we have to choose one or the other equivalence relation. Hence the ill-formedness of (20).

### 2.5.2.2 Degrees as equivalence classes

**2.5.2.2.1 Foundations** 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.<sup>11</sup>

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  $\geq_A$ , 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  $D_{\text{tall}}$  contains people, mountains, etc., but not ideas or colors, since the latter cannot be sensibly attributed a height.

The relation  $\geq_A$  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  $\geq_A$  as follows:

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

---

<sup>11</sup>In the rest of the chapter 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 1998b). Thus, this should not be understood as radically switching conceptions of degrees; there is still room for simplex degrees in the ontology.

The relation  $\geq_A$  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  $x$  is as tall as  $z$  (i.e. if  $\langle x, y \rangle$  and  $\langle y, z \rangle$  are members of the relation, then so is  $\langle x, z \rangle$ ). 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) main 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.<sup>12</sup> In this case, we can easily define an equivalence relation from  $\geq_A$  as follows.

$$(67) \quad x \simeq_A y \leftrightarrow x \geq_A y \wedge y \geq_A x$$

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

$$(68) \quad deg_A(x) = \{y \in D_A : x \simeq_A y\}$$

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* (and *non-connected*, by virtue of equivalence classes being disjoint sets).

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<sup>12</sup>There a number of ways we can order equivalence classes. Rullmann (1995), following Klein (1991), provides a simple one. The relation  $\geq_A$  may induce a relation  $\geq_A$  on the members of  $DEG_A$  such that  $deg_A(x) \geq_A deg_A(y)$  iff  $x \geq_A y \wedge y \not\geq_A x$ . It can be shown that  $\geq_A$  takes the equivalence classes in  $DEG_A$  (i.e. the degrees) 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).

- (69) a. *Reflexivity*:  $\forall d, d' \in DEG_A [d \simeq_A d']$   
 b. *Transitivity*:  $\forall d, d', d'' \in DEG_A [[d \simeq_A d' \wedge d' \simeq_A d''] \rightarrow d \simeq_A d'']$   
 c. *Symmetry*:  $\forall d, d' \in DEG_A [d \simeq_A d' \rightarrow d' \simeq_A d]$

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:<sup>13</sup>

(70) **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

**2.5.2.2.2 Cardinalities** The details of how to establish partitions from pluralities require some discussion of what individuals we consider with respect to the partition. Suppose we induce a partition over a set  $A$  via the equivalence relation “be the same cardinality as”. Now take a plurality of two people  $a \oplus b$ . Claiming without further ado that both  $a$  and  $b$  live in the cell corresponding to those pluralities of cardinality 2 might get us in trouble, 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. Intuitively this seems to go against the disjointness condition.

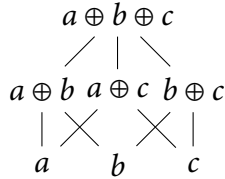
The solution is to adopt a Link (1983) style approach to pluralities (see §4.3.1.1 and footnote 11 in Chapter 4 as well). According to Link, plural entities are just *sums* of individuals (and not sets), as concrete as the individuals that serve to define them and of the same logical type. Plural morphology signals the presence of a pluralization operation  $*$  which generates

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<sup>13</sup>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*.

all the individual sums of members of the extension of any 1-place predicate. This operation forms a complete join-subsemilattice in the domain  $D$  of individuals 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  $D$ :

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



If a mapping exists between degrees and sets of individuals, as discussed above, each level in the Linkian structure above can be seen as an equivalence class. Assuming that cardinalities are simply degrees, as it is common practice, we can create a partition  $DEG_{card}$  on  $D$  by the equivalence relation  $\simeq_{card}$ .

(72) a.  $x \simeq_{card} y \leftrightarrow x \succeq_{card} y \wedge y \succeq_{card} x$  [where  $\succeq_{card} = a$  cardinality as big as]

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.

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

**2.5.2.2.3 And back to *ad hoc* subkinds** Let us turn back now to *ad hoc* subkinds. We started by asking about the connection between *ad hoc* subkinds and AMOUNT interpretations of relative clauses. My answer here is that we can arrive at both interpretations by appealing to partitions. Concretely, both constructions require a suitable equivalence relation that projects the partition. In the case of *ad hoc* subkinds, we saw evidence for this in Carlson’s (1977b) disjointness condition, which I have reproduced in the language of partitions. In the case of AMOUNT interpretations, we have seen that amounts, and degrees at large, can also be defined as equivalence classes, as sets of individuals, which in turn can induce a relevant partition.

In order to make the connection between *ad hoc* subkinds and AMOUNT interpretations of relative clauses explicit, we have to look a bit further into *ad hoc* subkinds. *Ad hoc* subkinds are inherently vague referring expressions. Although they refer to subkinds, they do not do so in a direct way. Compare:

- (74) a. The blue whale is becoming extinct.  
b. The whales that you like so much are becoming extinct.

One can refer to a subkind by directly mentioning its name. In this case, *blue whale* stands for a (taxonomic) subkind of whale. But not all subkinds have names; in fact, very few do. For all we know, the kind of *whales that you like so much* could be *blue whales*, but it could as well be almost any collection of whales that you fancy. That is, the subkind *whales that you like so much* are a subkind just by virtue of your liking them so much. In this case, then, the only “sufficiently regular behavior” that we may impute them is precisely that you like them so much.

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. *whale* in (74b), to a subset of whales. Crucially, this subset must be a member of one cell in a partition of whale subkinds.

Given the nature of partitions, information about one cell can help us form at least a bipartition, for instance, lumping together in one cell the individual whales that you like, and all the ones that do not belong in this cell occupying the sole other cell of the partition. Of course, the more information we might have about your preferences, the richer the partition could be.

Under this view, a critical part of resolving *ad hoc* subkind reference is being able to determine an equivalence relation that puts all the whales that you like in a single cell. This is not always as straightforward as it may seem and, sometimes, vagueness is rampant. Consider again:

(2a) It would take us years to drink the champagne that we spilled last night.

In this example, *the champagne that we spilled last night* is referring to an *ad hoc* subkind of champagne. If we go with the taxonomic interpretation of the sentence, we partition the domain of champagne into its different subkinds, and we assume that the particular champagne that the spilled last night lives in one of the cells. For instance, if we spilled a very rare kind of *prestige cuvée*:

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

Prestige cuvée	↪ the champagne that we spilled last night was a <i>prestige cuvée</i> .
Blanc de noirs	
Blanc de blancs	
Rosé Champagne	

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*. Now, it could be that the reason why it would take us so long to find the champagne that we spilled last night is because



it was much sweeter than usual. In that case, we can generate the relevant partition from an equivalence relation like *be as sweet as*.<sup>14</sup>

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

$d < 6gr$	
$6.1 < d < 12$	
$12.1 < d < 17$	
$17.1 < d < 32$	
$32.1 < d < 50$	
$d \geq 50$	$\leadsto$ the champagne that we spilled last night was $d$ -sweet.

To reiterate: subkind reference must be mediated by a partition to ensure that the domain is covered by non-overlapping sets. This partitioning is carried out by an equivalence relation that is only contextually determined. In the case of *ad hoc* subkind 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 (75) and (76) above is that different equivalence relations are picked in different contexts.

At this point, it is straightforward to extend the same reasoning to the classical AR examples and AMOUNT interpretations. Since we know that cardinalities 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 (2a), we could envision a partition like (77) (although partitions with different levels of granularity are possible, including partitions where champagne is measured by numbers of bottles).

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<sup>14</sup>These are not arbitrary, see <http://www.nytimes.com/2012/12/22/dining/22iht-wine22.html>.

(77) **Champagne partitioned by volume**

$0L \leq d < 1L$
$1.1L < d < 2L$
$2.1L < d < 3L$
$3.1L < d < 4L$
$4.1L < d < 5L$
...

→ the champagne that we spilled last night was  $d$ -much.

If this rationale is correct, AMOUNT interpretations of relative clauses are simply a case of *ad hoc* subkind reference. Thus, the only analysis we need is one that derives *ad hoc* subkind reference, and no appeal to degree semantics is necessary.

### 2.5.3 Interim conclusion

Making reference to subkinds requires structuring the domain in a certain way. I have argued that one way of capturing this requirement is by partitioning the relevant domain. Once this step is taken, a parsimonious account of AMOUNT interpretations of ordinary relative clauses is made available. Assuming degrees to be definable in terms of equivalence classes, we can exploit the idiosyncracies of *ad hoc* subkind reference to induce a partition of the domain introduced by the relevant kind term established via an equivalence relation that is in turn based on quantities or amounts. Given the evidence reported in sections §2.2 through §2.4 above, this account offers a number of advantages: (i) it accounts for the pervasive similarities between expressions that can refer to kinds and amounts in terms of their syntactic/semantic properties, (ii) it accounts for the lack of evidence for degree abstraction, and (iii) it relies on mechanisms that are independently needed for the interpretation of subkind-referring expressions as well as mappings between degrees and equivalence relations independently argued for in the literature about degrees.

## 2.6 Compositional implementation

The final task of this chapter is to provide a compositional analysis of *ad hoc* subkinds. In the reductionist approach advocated here there is no need for degree-specific machinery to account for AMOUNT interpretations of ARs, since these do not involve degrees in the usual sense. They only involve degrees insofar as degrees are one way of many to attribute the sufficiently regular behavior required to refer to subkinds. The compositional derivation that I present below, therefore, is a derivation of *ad hoc* subkind interpretations.

### 2.6.1 Basic semantics of kinds

In laying out my assumptions about kind reference I am following Chierchia (1998b) for the most part. The topic of kind reference is much richer than I can do justice here, and nothing of consequence for the derivation of AMOUNT interpretations bears on the particular implementation that I offer below. There is one novelty in the analysis that I will spell out: the use of a particular kind of mapping between kinds and subkinds, but this may be easily adapted to any other theory of kind reference (e.g., Carlson 1977b, Wilkinson 1995, Krifka 1995, Borer 2005, etc.).<sup>15</sup>

What is a kind? 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 sum of all individual dogs, which can then be modelled as the largest member of the plural individual comprising all dogs.

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<sup>15</sup>The discussion that follows is simplified at least in two respects: First, I will 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, 1998b) 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.

For any property, 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”.

(78) *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 (78) 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” (pretty 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. In Chierchia’s (1984, 54–55) words, “properties have two modes of being: one as ‘intrinsically functional’ entities, the other as individuals systematically correlated to those entities”.

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, (79a). In turn, the property of being a dog is equivalent to the predicativization of DOG.

$$(79) \text{ a. } \text{DOG} = \cap \lambda x. *dog(x)$$

$$\text{b. } \cup \text{DOG} = \lambda x. *dog(x) = \cup \cap \lambda x. *dog(x)$$

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. In the second case, most commonly with episodic sentences, we encounter a mismatch between a kind denoting argument and an predicate that lexically selects for non-kind predicates.

$$(80) \text{ a. } \text{Dogs are } \{\text{widespread/extinct/common}\}.$$

$$\text{b. } \text{Dogs are barking outside my window.}$$

In (80a) we encounter 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.<sup>16</sup> To derive this interpretation, we simply take the plural property denoting the totality of dogs ( $\lambda x. *dog(x)$ ) and apply the down operator to retrieve its individual correlate.

$$(81) \llbracket (80a) \rrbracket = \text{extinct}(\cap \lambda x. *dog(x))$$

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<sup>16</sup>If, instead, we try to combine a kind level predicate with an individual-denoting object, the result is semantically ill-formed. For instance, Fido cannot be extinct.

The example in (80b) 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; (80b) 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 (1998b) proposes a new rule of composition:

(82) Derived Kind Predication (DKP):

If  $P$  applies to objects and  $k$  denotes a property, 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.

(83)  $\llbracket \text{barking-outside-my-window} \rrbracket(\llbracket \text{dogs} \rrbracket) =$

$\exists x[\cup \lambda x. *dog(x) \wedge \text{barking-outside-my-window}(x)]$

Notice that, given the definitions in (78) above, we can further unpack (83) in (84), which may be more transparent:

(84)  $\llbracket \text{barking-outside-my-window} \rrbracket(\llbracket \text{dogs} \rrbracket) =$

$\exists x[x \leq \text{DOG} \wedge \text{barking-outside-my-window}(x)]$

In prose, there is some individual specimen of `DOG` (some particular dog) that is barking outside my window.

## 2.6.2 From kinds to subkinds

The next and final step to arrive at the desired *ad hoc* subkind interpretations involves a mapping from kinds to subkinds. There are a number of mappings in the literature between kinds and subkinds (e.g. Krifka et al. 1995, Wilkinson 1995, Zamparelli 1998), usually carried out by an operator, which is very similar in meaning 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 §2.5.2.1 we know what those conditions are. A partition of a kind  $K$  is a set  $G$  of subsets of  ${}^{\cup}K$  that covers  ${}^{\cup}K$  and where members of  $G$  do not share any instantiating individuals.

(85) **Cover:** A set of subkinds  $G$  is a cover of a kind  $K$  iff:

- a.  $G$  is a set of non-empty subsets of  ${}^{\cup}K$ .
- b.  $\forall x_o[x_o \leq K \rightarrow \exists y_k \in G[x_o \leq y_k]]$

In prose: for every object-level individual  $x_o$  that realizes the kind  $K$ , there is a kind-individual  $y_k$  in  $G$  that  $x_o$  is a realization of. This is only a necessary condition, but not sufficient, for no individual can instantiate two distinct subkinds of  $G$ . We need to add a ban on overlapping subkinds:

(86) **No overlap:**

$$\forall x_o[\exists y_k \in G[x_o \leq y_k] \rightarrow \neg \exists z_k \in G[y_k \neq z_k \wedge x_o \leq z_k]]$$

We can now simply define a partition function that meets these two criteria.<sup>17</sup>

(87) **Kind partition function**

A partition  $\Pi$  is a  $\langle kt, kt \rangle$  function such that for any kind  $K$ ,  $\Pi(K)$  meets two conditions:

- a.  $\forall x_o[\exists y_k \in \Pi(K)[x_o \leq y_k] \rightarrow \neg \exists z_k \in \Pi(K)[y_k \neq z_k \wedge x_o \leq z_k]]$
- b.  $\forall x_o[x_o \leq K \rightarrow \exists y_k \in \Pi(K)[x_o \leq y_k]]$

As an illustration, consider the case of  $K = \text{DOG}$  and  $G = \{\text{COLLIE}, \text{PUG}, \text{GREYHOUND}, \text{BEAGLE}, \dots\}$ .

Then condition (a) states that if  $x_o$  is an instance of the kind  $\text{DOG}$ , there is some subkind  $y_k$  in the set of subkinds  $G$  that  $x_o$  is also an instance of. This conditions make 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  $G$  that  $x_o$

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<sup>17</sup>Here the partition function is defined over kinds, but it can also be defined over sums once a the relevant part-whole properties of sum-individuals are made explicit; see Gillon (1987) and Schwarzschild (1996) for discussion.

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.

### 2.6.2.1 Basic cases

Now we can move on and talk about how to derive subkinds. We first induce a partition of a kind into the set of the individual correlates of its subkinds. We can do this by defining a kind-to-subkind operator that makes use of the partition function:

$$(88) \quad \llbracket KSK \rrbracket = \lambda x_k. \lambda y_k. \Pi(x_k)(y_k)$$

That is: *KSK* targets a kind,  $x_k$ , and returns a set of kind-individuals that partition it. The function returns the set of (individual correlates of) subkinds that are in the partition.

$$(89) \quad \begin{aligned} \llbracket KSK \rrbracket(\llbracket \text{DOG} \rrbracket) &= \lambda y_k. \Pi(\text{DOG})(y_k) = \lambda y_k. \Pi(\lambda x. *dog(x))(y_k) \\ &= \{\cap \lambda x. *greyhound(x), \cap \lambda x. *collie(x), \cap \lambda x. *beagle(x), \dots\} \\ &= \{\text{GREYHOUND}, \text{COLLIE}, \text{BEAGLE}, \dots\} \end{aligned}$$

If we want to account for its use with demonstratives (e.g., *that dog*), we may adopt the semantics of the anaphoric demonstrative provided by Scontras (2017):

$$(90) \quad \begin{aligned} \text{a. } \llbracket that \rrbracket &= \lambda P. \iota x_k [P(x_k) \wedge \cup x_k(that_i)] && \text{[where } that_i = \text{BEAGLE]} \\ \text{b. } \llbracket that \text{ dog} \rrbracket &= \iota x_k [\lambda y_k. \Pi(\text{DOG})(y_k)(x_k) \wedge \cup x_k(\text{BEAGLE})] \\ &= \iota x_k [x_k \in \{\cap \lambda x. *greyhound(x), \cap \lambda x. *collie(x), \cap \lambda x. *beagle(x), \dots\} \wedge \cup x_k(\text{BEAGLE})] \\ &= \iota x_k [x_k \in \{\text{GREYHOUND}, \text{COLLIE}, \text{BEAGLE}, \dots\} \wedge \cup x_k(\text{BEAGLE})] \\ &= \cap \lambda x. *beagle(x) = \text{BEAGLE} \end{aligned}$$

Here the kind interpretation of *that dog* simply returns whatever subkind of dog is retrieved by the anaphor, in this case the individual-correlate of the *BEAGLE* subkind. Unless we provide more criteria, however, the partition function does not have a way to determine what the



subkinds need to be. In this sense, these results echo Krifka et al.'s (1995) taxonomic function, which picks as its default a collection of natural or well-established subkinds.

### 2.6.2.2 *Ad hoc* subkinds

The final step is to manipulate the criteria that determine how we partition a kind. Put differently, in order to build *ad hoc* subkinds, we have to override the taxonomic default we saw earlier. I suggest to enforce this in the following way. The kind is partitioned just like we did above, but now the property contributed by the relative clause is used to further constraint what the relevant subkinds might be.

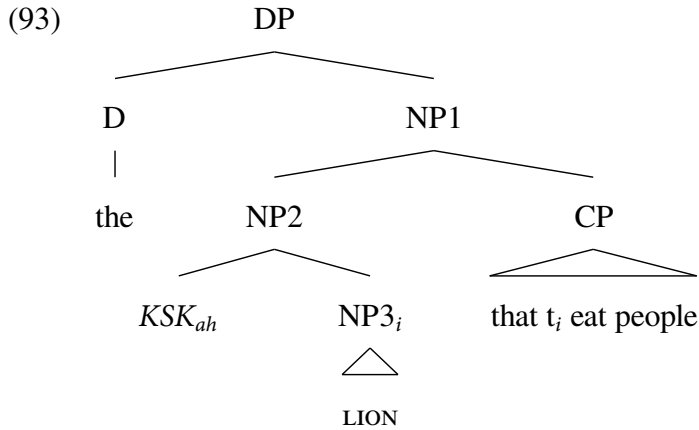
$$(91) \quad \llbracket KSK_{ah} \rrbracket = \lambda x_k. \lambda P_{(et)}. \lambda y_k. \forall z_o [(\cup x_k \cap P)(z_o) \rightarrow z_o \leq \Pi(x_y)(y_k)]$$

Let us unpack (91).  $KSK_{ah}$  is a function that takes a kind-individual  $x_k$  and a property  $P$  and returns a set of kind-individuals  $y_k$ . This is a set of subkinds of  $x_k$ . What is special about this set of subkinds is that all lions that eat people must instantiate some subkind  $y_k$ . That is, all individuals  $z_o$  that live in the intersection of (i) the property denoted by the relative clause—expressed as  $P$ —, and (ii) the property correlate of the kind  $x_k$ , must in turn realize some subkind  $y_k$ . Moreover, because  $y_k$  is a subkind of  $x_k$  in a partition of  $y_k$ , all  $z_o$  must belong to the same subkind.

Let us work out an example. Consider:

(92) The lions that eat people

*Lions that eat people* do not conform to a natural class, so this is a task for  $KSK_{ah}$  and *ad hoc* subkinds. Syntactically, assume a structure like the following.



By the time *KSK* gets to enter into the derivation, the NP already denotes a kind.<sup>18</sup>

- (94) a.  $\llbracket \text{NP2} \rrbracket = \llbracket \text{KSK}_{ah} \rrbracket (\llbracket \text{LION} \rrbracket)$   
 $= \lambda P_{\langle et \rangle} . \lambda y_k . \forall z_o [(\cup_{\text{LION}} \cap P)(z_o) \rightarrow z_o \leq \prod(\text{LION})(y_k)]$
- b.  $\llbracket \text{NP1} \rrbracket = \lambda y_k . \forall z_o [(\cup_{\text{LION}} \cap \llbracket \text{CP} \rrbracket)(z_o) \rightarrow z_o \leq \prod(\text{LION})(y_k)]$   
 $= \lambda y_k . \forall z_o [\text{lion}(z_o) \wedge \text{eat-people}(z_o) \rightarrow z_o \leq \prod(\text{LION})(y_k)]$

The first conjunct in the last line above returns a set of kind-individuals that forms a partition of lions and where (iii) one of the cells of the partition contains lions that eat people. As a consequence, non-people-eating lions will have to be in other cells in the partition. 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 the (taxonomic) default we alluded to above.

But how is then the rest of the partition completed? The most likely way 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 obtain a partition of lions like the following.

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<sup>18</sup>There a number of ways of doing this within; 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.

$$(95) \quad \{\cap\lambda.*lions\ that\ eat\ people, \cap\lambda.*lions\ that\ eat\ carrion, \cap\lambda.*lions\ that\ eat\ grass\dots\} \\ = \{LIONS\ THAT\ EAT\ PEOPLE, LIONS\ THAT\ EAT\ CARRION, LIONS\ THAT\ EAT\ GRASS\dots\}$$

What matters most is that the modifier, the relative clause in these case, is telling us what one of the subkinds must be.<sup>19</sup> Now the definite article can simply contribute an  $\iota$ -operator:  $\llbracket the\ P \rrbracket =$  the largest member of  $P$ , if there is one. It applies to the set of subkinds of lions that eat people and returns its maximal element, lumping them together in the individual correlate of the property *be a people-eating lion*.

$$(96) \quad = \iota y_k. \forall z_o [lion(z_o) \wedge eat\text{-}people(z_o) \rightarrow z_o \leq \Pi(LION)(y_k)] \\ = \cap\lambda z.*lion(z) \wedge eat\ person(z)$$

We are almost done. The resulting DP can serve as an argument to non-kind-selecting predicates via Derived Kind Predication (see (82) above). The kind interpretation of a sentence like (97a) is in (97b).

- (97) a. You like the lions that eat people.  
 b.  $\exists y[\cup(\cap\lambda z.*lion(z) \wedge eat\ person(z))(y) \wedge like(y)(you)]$

That is, a sentence like (97a) asserts the existence of an instantiation of the *ad hoc* lion subkind that eats people, and that you like those instantiations.

With this, we are done. A sentence like (98a) receives a single interpretation (under its KIND reading), stated in (98b).

- (98) a. In thirty minutes Mary saw the birds that John saw in a day.  
 b.  $\exists y[\cup(\cap\lambda x.*bird(x) \wedge saw\text{-}in\text{-}a\text{-}day(x)(John))(y) \wedge saw\text{-}in\text{-}thirty\text{-}minutes(y)(you)]$

Notice that, practically speaking, (98b) may be interpreted in any number of ways. This is because all the semantics of  $KSK_{ah}$  forces us to do is find a partition of birds where the birds

---

<sup>19</sup>Bear in mind that in order to avoid overlapping cells in the partition we have to be careful about the language we use to express the relevant subkinds. Thus, if we want to consider *lions that eat people and carrion* as an available subkind, we should differentiate between them and *lions that **only** eat people*.

that John saw in a day live in one cell. What characterizes those birds is determined by the context. For instance, it could be that John saw very strange birds, and that Mary saw birds of comparable strangeness in a shorter span of time. This is a possible interpretation of (98a) and is captured by (98b). Alternatively, it could be that John saw  $n$ -many birds in one day and Mary saw as many in a shorter span of time. What particular criteria we adopt is set by its plausibility in the context, provided that the partition requirement is satisfied.

## 2.7 Assessment and conclusion

The merits of looking at English so-called ARs this way are various. All the properties of AMOUNT interpretations of ARs discussed in sections §2.2 through §2.4 follow without further ado, namely, (i) it accounts for the AMOUNT  $\subseteq$  KIND generalization in 1 above, which states that AMOUNT interpretations of relative clauses are parasitic on kind interpretations; (ii) it provides a new way to look into the connection between the words *amount* and *kind* (coincidentally with recent results by Scontras 2017); (iii) it explains why AMOUNT interpretations are not subject to the typical restrictions that we observe with constructions that involve degree-abstraction and degree-operators. Thus, if the results reported here are on the right track, ARs in English may not exist as we knew them. This conclusion, however, only extends to the type of ARs discussed in this dissertation, and not to other potential candidates (e.g. ACD ARs, etc.).

Before concluding, I must point out two issues on which the view that AMOUNT interpretations are parasitic on KIND readings does not shed light on. The analysis presented here does not make predictions about when or why AMOUNT interpretations are not available. In some contexts where KIND interpretations are quite natural, AMOUNT interpretations seem to be unavailable, and no tinkering with the context will improve the situation. Complex demonstratives provide the clearest example. Take the two questions in (99) and the answer in (100). Only the question in (99a) may receive an answer like (100).

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

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

(100) I've been drinking that wine for ten years now. ✓(99a); ✗(99b)

This means that although (100) 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 answer that works for (99b) is the minimally different (101).

(101) I've been drinking that much wine for ten years now. ✗(99a); ✓(99b)

A further potential issue of this account has to do with noun *kind* itself.<sup>20</sup> If AMOUNT interpretations are really *ad hoc* subkind interpretations, then why is the noun *kind* incompatible with the AMOUNT interpretation? Consider:

(102) 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

Given the analysis provided here, the noun *kind* in (102b) is doing what the kind-to-subkind operator  $KSK_{ah}$  is doing covertly in (102a). And yet the an AMOUNT interpretation is out in (102b). Perhaps, then, the operator  $KSK_{ah}$  does not fully parallel the English word *kind*, but I do not have an answer yet as to why or how that should be.

Nothing of what we have said so far hints a solution for these two issues, and so I will leave them open here.

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<sup>20</sup>I thank Seth Cable for pointing this out to me.

## CHAPTER 3

### NOMINAL AMOUNT RELATIVES IN SPANISH

#### 3.1 Initial considerations

The goal of this chapter is to analyze Spanish Amount Relatives when they appear as complements to predicates that take nominal arguments. I will refer to these constructions as nominal Amount Relatives, nominal ARs for short. From a semantic standpoint, nominal ARs in Spanish seem to be no different from their English counterparts. Thus, the classic examples that we find in the literature on ARs in English work with nominal ARs in Spanish as well.

- (1) a. Nos llevaría años beber el champán que derramamos en la fiesta.  
us.DAT take years drink the champagne that spilled in the party  
'It would take us years to drink the champagne that we spilled at the party'
- b. Perdimos la batalla porque no teníamos los soldados que tenía nuestro  
lost the battle because not have the soldiers that have our  
enemigo.  
enemy  
'We lost the battle because we didn't have the soldiers that our enemy had'

The distinguishing property of Spanish is that it shows a greater degree of freedom in the construction of nominal ARs, and allows them in environments where they seem to be impossible in English. Of the examples below, only the Spanish variants are reported to have the relevant AMOUNT interpretations out of the blue.

- (2) a. He visto los pájaros que tú has visto.  
 aux seen the birds that you aux. seen  
 ‘I have seen the birds that you have seen.’
- b. Pedro ha escrito los libros que escribió Tolstoy.  
 Pedro aux written the books that wrote Tolstoy  
 ‘Pedro has written the books that Tolstoy wrote.’
- c. Juan ha traído las manzanas que trajo Pedro el año pasado.  
 Juan aux brought the apples that brought Pedro the year past  
 ‘Pedro has brought the apples that brought Pedro last year.’

In contrast, English speakers seem to require considerable more contextual support to accept sentences like (2). For instance, take (2b) above: out of the blue, the English translation is odd, presumably because nobody can write the same books that Tolstoy wrote. This oddness is indicative of the lack of an AMOUNT interpretation. But now consider the same example in the following dialog.

- (3) Emil Sinclair is an incredible young writer. I was reading about him today and, you won’t believe it, he is only 30 and he has already written the books that Tolstoy wrote.

There is a contrast—at least for some speakers—between (2b) and (3): in (3) the AMOUNT interpretation is now easier to access. But the fact that Spanish allows AMOUNT interpretations in (2) quite effortlessly raises the possibility that the source of the AMOUNT interpretation in the two languages is underlyingly different.

The goal of this chapter is to argue that Spanish truly possesses a mechanism to deliver amounts that is absent in English. In a nutshell, I locate the source of the difference between the two languages in the ability of Spanish to construct relative clauses that denote definite descriptions of degrees (maximalized sets of degrees, to be precise), that can in turn be used as Measure Phrases. Moreover, the syntactic structure that permits us to do so in Spanish

differs minimally from the analysis of propositional ARs that I will present in Chapter 4. The resulting picture is one where propositional ARs and nominal ARs are related to each other in the same exact way in which interrogatives clauses and free relative clauses relate to each other.

From a semantic point of view, the analysis captures the three main properties of ARs at large, as discussed in §1.3.1 and summarized below.

#### (4) **Desiderata for AMOUNT interpretations**

- a. *Definiteness*: AMOUNT interpretations refer to a definite amount.
- b. *Indefiniteness*: The head of the relative clause is interpreted as an indefinite.
- c. *Identity*: AMOUNT interpretations require a comparison of two amounts of same stuff.

The chapter takes off by first discussing the syntactic aspects of nominal ARs in Spanish, which will be crucial to understanding the differences between English and Spanish. Then, I propose a semantic analysis of Spanish nominal ARs and conclude with a general assessment.

## **3.2 Quantity free relatives in Spanish**

### **3.2.1 Finding the pieces to build nominal ARs**

Spanish has an independent ability to generate relative clauses with AMOUNT interpretations in simple contexts similar to (2). Moreover, it can do so through either one of two constructions: *cuanto* and *lo que* free relatives. Though these constructions do not superficially match nominal ARs, we can identify in them all the pieces that are required to derive the AMOUNT interpretation for nominal ARs. In a nutshell, the way that I propose to look at nominal ARs is the following. We start off with the observation that Spanish allows AMOUNT interpretations where English does not (at least not readily). The burden of explaining this contrast is placed on a particular syntactic structure which is available in Spanish but absent from English. Evidence for this syntactic construal comes from relative constructions other than nominal ARs, the already mentioned *cuanto* and *lo que* free relatives. It follows then



that Spanish nominal ARs cannot be mere ordinary headed relative clauses, but something else. Thus, I propose an analysis of Spanish nominal ARs where they are in fact very closely related to propositional ARs, on the one hand, and free relatives, on the other, but crucially different from restrictive relative clauses.

Following this narrative, the syntactic make-up of nominal ARs depends on certain properties of Spanish free relatives that are absent from English. The first such property is the ability to form quantity free relatives. Quantity free relatives are free relatives formed with the quantity relative pronoun *cuanto*, and are somewhat of a rarity even among Romance languages. The examples in (2) all have variants with *cuanto* that have the relevant AMOUNT interpretation.

- (5) a. He visto cuantos pájaros has visto tú.  
 aux seen how many.MS.PL birds you aux seen  
 ‘I have seen as many birds as you have seen.’
- b. Pedro ha escrito cuantos libros escribió Tolstoy.  
 Pedro aux written how many.MS.PL books wrote Tolstoy  
 ‘Pedro has written as many books as Tolstoy wrote.’
- c. Juan ha traído cuantas manzanas trajo Pedro el año pasado.  
 Juan aux brought how many.FM.PL apples brought Pedro the year past  
 ‘Juan has brought as many apples as Pedro brought last year.’

Free relatives formed with *cuanto* have the ability to pied-pipe an NP to the front of the relative clause. Excluding *-ever* free relatives, this is not generally possible in English (see also Caponigro 2002 and Cecchetto and Donati 2015 for a cross-linguistic assessment of this generalization), nor in *lo que* free relatives in Spanish.<sup>1</sup>

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<sup>1</sup>At this point, I do not have an answer as to why English only allows *how many* free relatives with *ever*. There are a number of semantic properties that distinguish the two types of free relatives, most notably that *ever* free

- (6) a. \*I read what book you read.  
 b. \*He leído lo libro que tu has leído.  
 aux read the.NT book that you aux read

Thus, the ability to form quantity free relatives with *cuanto* constitutes the first piece of evidence that Spanish has nominal *wh*-constructions that specifically deliver AMOUNT interpretations. Moreover, the lack of analogous constructions in English give us a first point of divergence between both languages.

The second piece of evidence comes from *lo que* free relatives. Spanish is a language that cannot form free relatives with the relative pronoun *que* (“what”). Instead, a CP headed by the complementizer *que* appears directly as the complement of the definite article.<sup>2</sup>

- (7) Juan comió lo que Pedro cocinó  
 Juan ate the that Pedro cooked  
 ‘Juan ate what Pedro cooked’

The derivation of a *lo que* free relative involves a null *wh*-operator that raises from a CP internal position to [Spec,CP], very much like in ordinary free relatives, as is clear from the comparison of the two structures in (8) below (e.g. Gutiérrez-Rexach 2014).

- (8) a. *English free relative*  
 $[_{DP} D_{\emptyset} [_{CP} \text{what}_i [ C^{\circ} [+REL] \emptyset [_{TP} \text{Pedro cooked } t_i ] ] ] ] ]$   
 b. *Spanish lo que free relative*  
 $[_{DP} \text{lo} [_{CP} Op_i [ C^{\circ} [+REL] \text{que} [_{TP} \text{Pedro cocinó } t_i ] ] ] ] ]$

---

relatives have a modal flavor (Dayal 1997, von Stechow 2000 a.o.). However, it is not clear how the cross-linguistic morphological generalizations observed by Caponigro (2004) bear on these semantic differences.

<sup>2</sup>The consensus is that in *lo que* free relatives *que* is not a pronoun, just a complementizer. For discussion see Bruccart (1992a) and Arregi (1998) a.o.

The structures are formally identical, differing only in the pieces that each language realizes overtly vs. covertly: Spanish shows overtly what English does covertly, and vice-versa.

Summing up, Spanish has both the ability to form free relatives with overt definite articles and the ability to form free relatives with nominal heads that have quantity-oriented meanings. These are the two pieces that I will use to build nominal ARs in Spanish.<sup>3</sup>

### 3.2.2 Semantic considerations

Now that we have laid out the syntactic considerations regarding *cuanto* and *lo que* free relatives in Spanish, we ask how their structures are interpreted to give rise to AMOUNT interpretations. From a semantic point of view, it is obvious why *cuanto* free relatives are able to deliver AMOUNT interpretations, since it is part of the lexical content of *cuanto* (“how many”). But *lo que* free relatives are ambiguous. The sentence in (9) has both an OBJECT and an AMOUNT interpretation.

- (9) Es imposible comer lo que Juan come.  
is impossible eat the that Juan eats
- i. ‘It is impossible to eat what Juan eats’
  - ii. ‘It is impossible to eat as much as Juan eats’

This suggests that the null *wh*-operator *Op* in *lo que* free relatives like (8b) may optionally be a variant of *cuanto* (“how many”) as well.

Now that we have seen the range of interpretations available for free relatives, we can ask: what are the available interpretations of nominal ARs? As a testing ground, let us try the verb *escribir* (“write”), which may take both interrogative and nominal complements (see discussion in Chapter 4). This flexibility allows us to tease apart the meanings that come about with propositional ARs on the one hand, and nominal ARs, on the other. The relevant sentence is (2b), repeated below.

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<sup>3</sup>It is important to notice that there are important differences in terms of word order restrictions between nominal ARs and the propositional ARs discussed in the next Chapter (see §4.1.3).

(2b) Pedro ha escrito los libros que escribió Tolstoy.

Pedro aux written the books that wrote Tolstoy

‘Pedro has written the books that Tolstoy wrote.’

In §4.1.3.1 of the next chapter I discuss the relevance of Subject-Verb inversion in Spanish propositional ARs. For the moment, it suffices to know that propositional ARs, unlike nominal ARs, require SV inversion.<sup>4</sup> In the case of (2b), the sentence contains a relative clause with SV inversion (*escribió* precedes the subject *Tolstoy*). As a consequence, a propositional AR parse is available: a parse where (2b) is interpreted as a subordinate question. In this particular case, (2b) is ambiguous between two different propositional ARs parses: one corresponding to a subordinate identity of OBJECT question, the other corresponding to an identity of AMOUNT question.

(10) a. Pedro ha escrito qué libros escribió Tolstoy.

Pedro aux written what books wrote Tolstoy

‘Pedro has written what books Tolstoy wrote.’

b. Pedro ha escrito cuántos libros escribió Tolstoy.

Pedro aux written how many books wrote Tolstoy

‘Pedro has written how many books Tolstoy wrote.’

That is (2b) is true under a parse equivalent to (10a) if Pedro took a piece of paper and wrote down a list with all of Tolstoy’s works (*War & Peace*, *Anna Karenina*, *The death of Ivan*

---

<sup>4</sup>This is an old observation (e.g. Plann 1984 a.o.). As an illustration, consider the contrast between the two variants below. Propositional ARs, which appear as complements to *wh*-embedding predicates like *preguntarse* (“wonder”) below, are only grammatical with SV inversion.

(i) Me pregunto las manzanas que { comió Pedro / \*Pedro comió }.

I.DAT wonder the.FM.PL apples that ate Pedro

‘I wonder {what/how many} apples Pedro ate’

The full discussion of these facts is provided in §4.1.3.1. For the moment, it suffices to take the requirement of SV inversion with propositional ARs to tease them apart from nominal ARs, which are compatible with it, but do not require it.

Ilyich, etc.). Under a parse equivalent to (10b), the sentence is true if what Pedro wrote down was the number of books that Tolstoy wrote (in this case, 12, counting novels and novellas).

Now let us take a look at what happens in the absence of SV inversion. Recall that, SV inversion being a necessary requirement of propositional ARs, its absence guarantees that the relative clause is not interpreted as a propositional AR (again the full discussion of this restriction is discussed in §4.1.3.1). That is, (11) cannot have the same structure as the AR in (2b).

(11) Pedro ha escrito los libros que Tolstoy escribió.

Pedro aux written the books that wrote Tolstoy

‘Pedro has written the books that Tolstoy wrote.’

This example has a number of available interpretations as well. The ordinary restrictive relative clause interpretation is available, but is of course false, for Pedro could not have possibly written *War & Peace*, *Anna Karenina*, etc. The identity of OBJECT question interpretation in (10a) is still available, however. How so? In this case, because nothing precludes the relative clause in (11) to be interpreted as concealed question.<sup>5</sup> Finally, the sentence also has an AMOUNT interpretation, but one that is different from (10b):

(12) Pedro ha escrito cuantos libros Tolstoy escribió.

Pedro aux written how many books Tolstoy wrote

‘Pedro has written as many books as Tolstoy wrote.’

The difference between the two AMOUNT interpretations in (10b) and (12) revolves around what exactly Pedro wrote. In (10b), Pedro wrote a number, but in (12) he wrote books. The following paraphrases may help in teasing the two interpretations apart.

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<sup>5</sup>This meaning can be derived as discussed in §4.5.

(13) a. *Paraphrase of (10b)*

Pedro has written down the number corresponding to the number of books that Tolstoy wrote.

[True *iff* Pedro wrote down the number 12]

b. *Paraphrase of (12)*

Pedro has written the same number of books that Tolstoy wrote.

[True *iff* Pedro wrote any 12 books]

Because SV inversion is optional for nominal ARs, the interpretation in (12) is also possible for (2b). Interestingly, however, the identity of AMOUNT interpretation in (10b) is absent from (11). In §3.5.1, after I have spelled out the analysis, I explain why identity of OBJECT interpretations are available in (11), and what precludes identity of AMOUNT readings from arising in this construction.

### 3.3 The syntax of nominal ARs

The upshot of the previous section is that unlike English, Spanish makes use of two different free relatives that denote amounts. How does this bear on nominal ARs? I argue that nominal ARs in Spanish *are* in fact free relatives, of a sort that is a cross between *cuanto* and *lo que* free relatives. Like *lo que* relatives, nominal ARs have an overt definite article, and like *cuanto* free relatives, they involve a quantity-denoting *wh*-operator that pied-pipes an NP. Moreover, I suggest that this particular strain of free relatives are related to the propositional ARs discussed in the next chapter much in the same way as free relatives and *wh*-constructions are often taken to be related.

Given the surface similarity (and often string-identity) of free relatives and interrogatives in languages like English, the two constructions are often taken to have a common core. However, given their radically different external distribution, the two must also be fundamentally different in some way. One way to characterize this key difference is to think of free relatives

as requiring an argumental type meaning, unlike questions. Following the influential ideas in Jacobson (1995) and Caponigro (2004) a.o., the difference can be captured analytically by dissociating the  $C^\circ$  head in free relative clauses from whatever will give rise to question-  
semantics.

(14) **English *wh*-constructions**

a. *Interrogative*

$[_{CP} \text{ what}_i [ C^\circ [+WH] [_{TP} \text{ Mary bought } t_i ] ] ]$

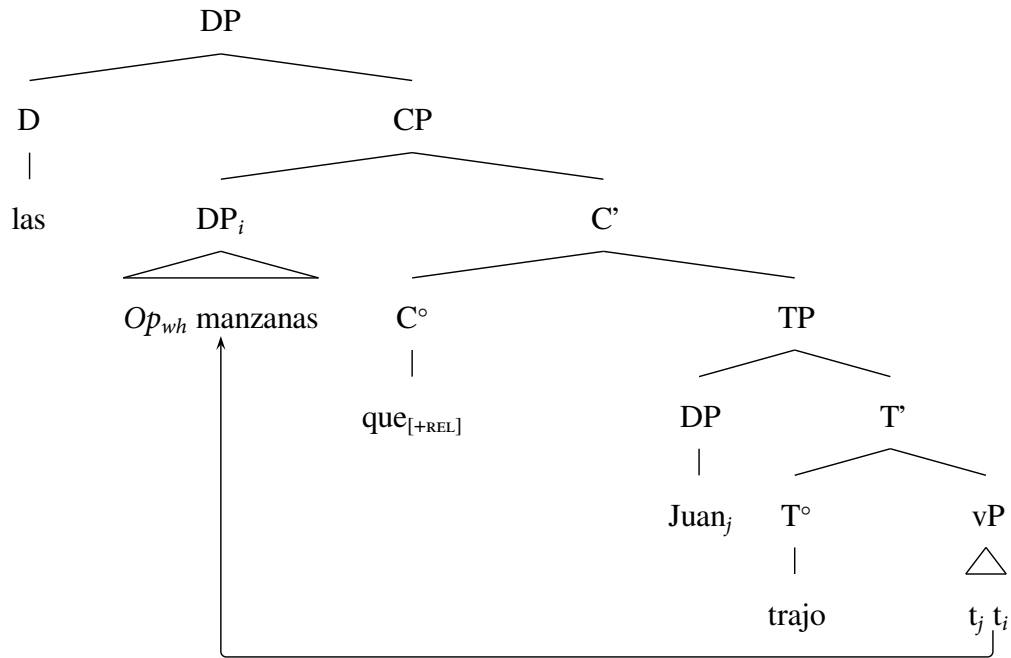
b. *Free relative*

$[_{DP} D_\emptyset [_{CP} \text{ what}_i [ C^\circ [+REL] [_{TP} \text{ Mary bought } t_i ] ] ] ]$

On this view, then, free relatives are a hybrid between questions and ordinary restrictive relative clauses. Like questions, they involve movement of a *wh*-operator, but like nominals restricted by relative clauses, the resulting object is a DP denoting an individual.

I argue that the difference between nominal and propositional ARs in Spanish also comes down to a difference in the presence/absence of an interrogative core with question semantics. Building on the proposed structure for *lo que* free relatives, I suggest the following syntactic structure for Spanish nominal ARs.

(15) **Syntactic structure of nominal ARs in Spanish** [with optional T-to-C movement]



Variation in just a few key pieces is able to capture the similarities and differences between nominal ARs and the more transparent free relatives. The parallel external distribution of nominal ARs and *lo que* and *cuanto* free relatives follows from the fact that nominal ARs are a subtype of free relatives. If correct, then Spanish allows structures like (15) for clauses that, on the surface, look like ordinary restrictive relative clauses. Moreover, this particularity of Spanish is not shared by other languages like English, for it depends on idiosyncrasies related to how free relatives may be constructed in the language.<sup>6</sup>

Let us recap. The desiderata we started this section with involved finding a syntactic construction particular to Spanish and crucially absent from English, that would help us understand why Spanish allows nominal ARs so freely. I argued that nominal ARs are, despite appearances, free relatives, sharing properties with other two existing free relative constructions in the language, *lo que* and *cuanto* free relatives. The next step is to explain how and why

<sup>6</sup>For discussion on the full gamut of Spanish *wh*-constructions, see §4.2.4.



attributing this syntax to nominal ARs can explain the contrasts in the availability of AMOUNT interpretations between English and Spanish.

### 3.4 Nominal ARs as degree expressions

In Chapter §1 we saw that virtually all semantic analyses of ARs in the literature (e.g. Carlson 1977a, Heim 1987, Grosu and Landman 1998, etc.) entertain analyses where the CP in the embedded positions denotes a degree property. In this section I provide my own analysis of Spanish nominal ARs on the basis of the same premises.

The semantic analysis that I propose for Spanish nominal ARs is built in two steps. First, nominal ARs are argued to denote to a maximal degree (a definite description of a degree). Then, the resulting degree description may take up the role of a Measure Phrase in an ordinary pseudo-partitive construction (e.g. *three kilos of tomatoes*), where the head noun has undergone elision under identity. The resulting construction amounts to the property of individuals denoted by the elided NP as measured by the maximal degree denoted by the nominal AR.

#### 3.4.1 Step 1: Deriving a maximal degree

The first step is to provide a semantics for the nominal AR itself. As mentioned above, I assume that nominal ARs in Spanish—and *cuanto* free relatives, for that matter—denote maximal degrees. This is in accordance with traditional approaches to ARs, as well as Grosu and Landman’s (1998). The derivation proceeds very similarly to what we saw with propositional ARs. The relevant LF structure we start off is repeated below:

- (16)  $[\text{DP}_1 \text{ las } [\text{CP}_1 [\text{DP}_2 \text{ MANY manzanas } ]_i [\text{CP}_2 \text{ que Juan trajo } t_i ]]]$   
           the                          apples                          that Juan brought  
           ‘The apples that Juan brought’

As is common practice, we employ a silent MANY quantifier, familiar from the literature on comparative constructions.

$$(17) \quad \llbracket \text{MANY} \rrbracket = \lambda P_{\langle et \rangle} . \lambda Q_{\langle et \rangle} . \lambda d . \exists x [P(x) \wedge Q(x) \wedge |x| = d]$$

The final technical adjustment involves the definite determiner. In this case, I assume that when the definite article in Spanish applies to a set of degrees, it returns its maximal element (Gutiérrez-Rexach 1996, 1999, 2014). The operator  $\text{MAX}$  is defined following Russell's  $\iota$ -operator, and so it requires the existence of a unique maximal element. Thus, although I will often use (18a) as a shorthand, bear in mind that the full definition of  $\text{MAX}$  is that of (18a).

$$(18) \quad \text{a. } \llbracket \text{MAX} \rrbracket = \lambda N_{\langle dt \rangle} . \iota n [N(n)] \quad [\text{i.e. } \iota n [N(n)] \leftrightarrow \text{MAX}(N)]$$

$$\text{b. } \llbracket \text{MAX} \rrbracket = \lambda N_{\langle dt \rangle} . \iota d [d \in N \wedge \forall d' [d' \in N \wedge d \neq d' \rightarrow d' < d]]$$

From here, I follow Jacobson's (1995) and Caponigro's (2004) syntax-semantics mapping of free relatives.

$$(19) \quad \text{a. } \llbracket \text{DP}_2 \rrbracket = \lambda Q_{\langle et \rangle} . \lambda d . \exists x [manzanas(x) \wedge Q(x) \wedge |x| = d]$$

$$\text{b. } \llbracket \text{CP}_2 \rrbracket = \lambda x . [trajo(Juan, x)]$$

$$\text{c. } \llbracket \text{CP}_1 \rrbracket = \lambda d . \exists x [manzanas(x) \wedge trajo(Juan, x) \wedge |x| = d]$$

$$\text{d. } \llbracket \text{DP}_1 \rrbracket = \text{MAX}(\lambda d . \exists x [manzanas(x) \wedge trajo(Juan, x) \wedge |x| = d])$$

$$= \iota d [ \exists x [manzanas(x) \wedge trajo(Juan, x) \wedge |x| = d]]$$

Semantically, the nominal AR denotes the maximal degree that holds of the individuals that are in the extension of the two properties (being an apple and being brought by Juan). Intuitively, this is what we want: maximalization restricts the set of degrees to its maximal degree, if there is one. So far, these results replicate Grosu and Landman's (1998).

### 3.4.2 Step 2: Enter the Measure Phrase

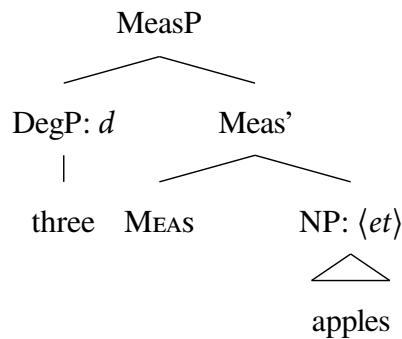
The next step in the derivation is to fix the sortal mismatch with verbs that take  $e$ -type arguments. In §1.4.3 we described how this is one of the biggest challenges of ARs at large. The solution that I suggest to solve the problem relies on thinking of nominal ARs as Measure Phrases. Given that nominal ARs only operate in the dimension of  $\text{QUANTITY}$ , i.e. they

only provide cardinalities, I will take them to be part of a NP where they attribute a certain cardinality to the property denoted by the NP (although see Chapter 5 for an application to Degree Neuter Relatives).

### 3.4.2.1 The syntax and semantics of cardinal numbers

The basic assumption about the syntax and semantics of cardinal numbers follows ideas from Hurford (1975), Ionin and Matushansky (2006), Kayne (2005) and Solt (2015). As an illustration, take the NP *three apples*; the basic structure that we are concerned with looks as follows.

#### (20) Basic syntax of cardinal numbers



As the tree makes explicit, I assume a degree semantics for cardinal numbers, following a similar treatment as Solt’s (2009) for quantity denoting words like *many* and *few*. On my view, numerals are just names of degrees, syntactically occupying the specifier of a Number Phrase projection, whose task is that of measuring the cardinality of an individual. To do so, it requires the mediation of a measuring function, represented as MEAS above. This MEAS function has been proven to be well motivated both on syntactic (Kayne 2005, Zweig 2005, a.o.) as well as semantic grounds (e.g. Rett 2008, Wellwood 2015, Solt 2015 a.o.).<sup>7</sup> There are a number of ways MEAS can be defined so that the composition of (20) succeeds. Here

---

<sup>7</sup>Different authors give different names to the MEAS head. Ultimately, this way of mapping individuals to cardinalities is a way of recasting old ideas by Cartwright (1975) and Cresswell (1976), who brought attention to the necessity for a mechanism that would allow us to go back and forth between individual denoting expressions and their cardinalities.

I adopt a simple one: MEAS simply takes a degree  $d$  and returns the property of individuals whose cardinality equals  $d$ .

$$(21) \quad \llbracket \text{MEAS} \rrbracket = \lambda n_d. \lambda x_e. |x| \geq n$$

The obvious issue with this simple definition of MEAS is that it cannot yet combine with the NP. Moreover, the motivation for introducing MEAS is to create a gradable predicate—of type  $\langle d, et \rangle$ —that may later take a simplex degree of type  $d$ . That is, the resulting phrase  $[\text{MEAS NP}]$  must be of type  $\langle d, et \rangle$ , and so other alternatives like existentially closing the denotation of the NP will not do. To solve the mismatch I appeal to a variant of Kratzer’s (1996) Event Identification rule (cf. Degree Argument Introduction in Solt 2015), call it Degree Identification:<sup>8</sup>

(22) DEGREE IDENTIFICATION (DI):

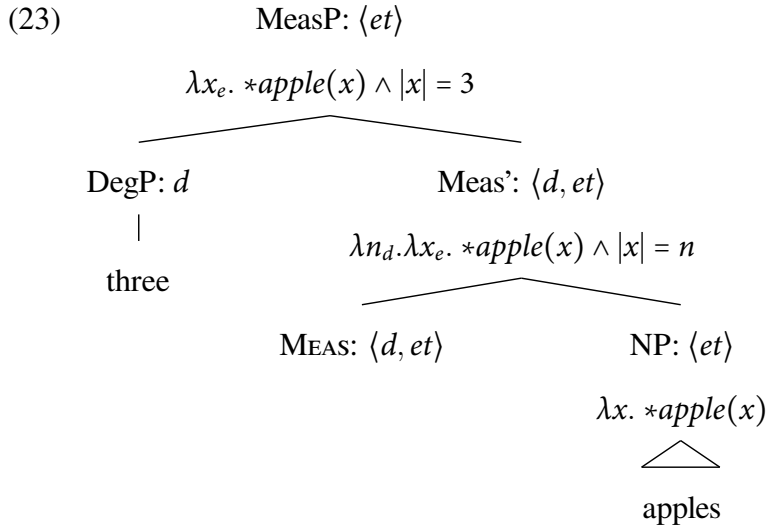
If  $\alpha$  is a branching node,  $\{\beta, \gamma\}$  are the set of  $\alpha$ ’s daughters, and  $\llbracket \beta \rrbracket = \lambda x_e. P(x)$ ,  $\llbracket \gamma \rrbracket = \lambda n_d. \lambda x_e. Q(n)(x)$ , then  $\llbracket \alpha \rrbracket = \lambda n_d. \lambda x_e. P(x) \wedge Q(n)(x)$ .

That is, Degree Identification is a mode of composition that makes it possible to identify any two individuals with respect to a single degree description. It takes two functions  $g \in D_{\langle d, et \rangle}$  and  $f \in D_{\langle et \rangle}$  and returns a function  $h \in D_{\langle d, et \rangle}$ . The parallelism with Event Identification is absolute. The semantic computation of an ordinary NP like *three apples* goes now as follows:

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<sup>8</sup>Notice that a second option is to provide two different definitions of MEAS, a predicative and an attributive version.

- (i) a.  $\llbracket \text{MEAS}_{\text{attributive}} \rrbracket = \lambda P_{\langle et \rangle}. \lambda n_d. \lambda x_e. [P(x) \wedge |x| \geq n]$   
 b.  $\llbracket \text{MEAS}_{\text{predicative}} \rrbracket = \lambda n_d. \lambda x_e. [|x| \geq n]$

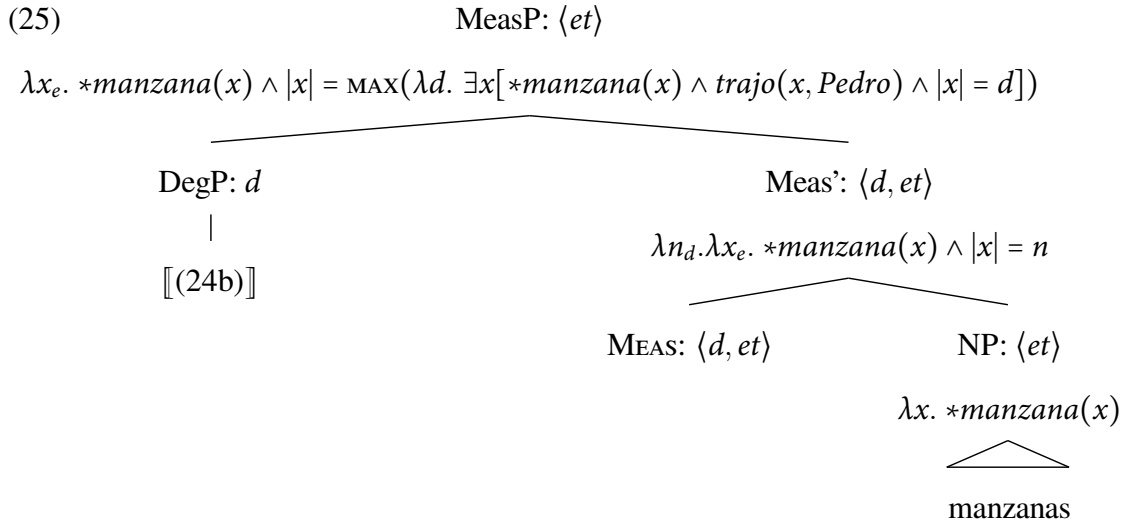


### 3.4.2.2 Application to nominal ARs

We are now ready to calculate the meaning of a nominal AR. Given that nominal ARs denote definite degrees, we can simply use them as inputs to Meas' in structures like (20). An AR like (16) above has now the meaning in (24b):

- (24) a. [ las [<sub>CP1</sub> [ MANY manzanas ]<sub>i</sub> [<sub>CP2</sub> que Pedro trajo t<sub>i</sub> ] ] ]  
the apples that Pedro brought  
'The apples that Pedro brought'
- b.  $id[ \exists x[manzanas(x) \wedge trajo(Juan, x) \wedge |x| = d] ]$   
 $= \text{MAX}(\lambda d. \exists x[manzanas(x) \wedge trajo(Pedro, x) \wedge |x| = d] )$

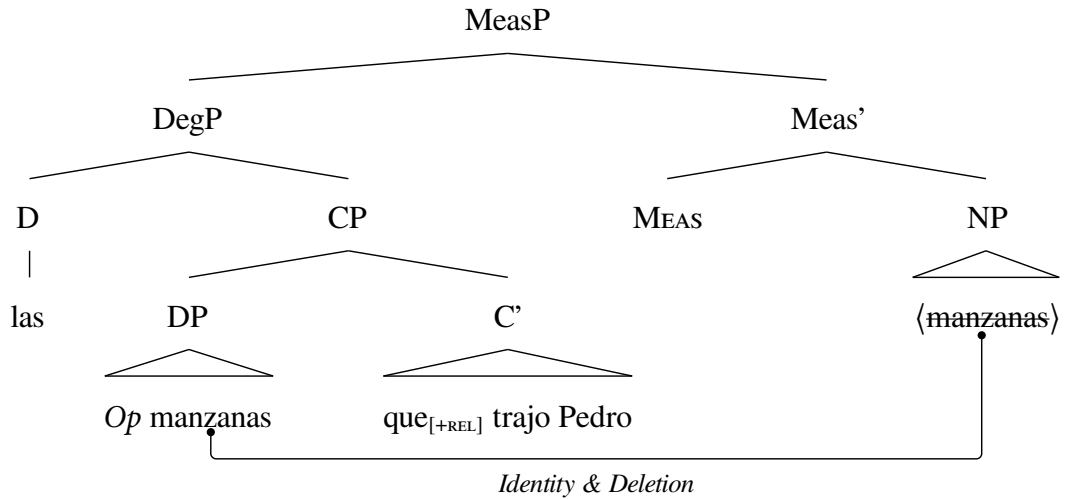
The unique maximal degree denoted by (24b) can now measure the cardinality of the NP in the head position just like the numeral *three* did in the previous case. Critical for the calculation to go through is the assumption that there is in fact a head identical to the head internal to the nominal AR.



While a full assessment of the full analysis will have to wait for later, we can already notice some desirable features of (25): (i) maximalization happens at the degree level only, (ii) the resulting object is not a degree and so no sortal mismatch arises when combining with other verbal predicates, and (iii) no *ad hoc* elision of the definite article is required.

The property of this proposal that requires more discussion is the syntactic procedure that elides the head NP. Schematically:

(26) NP elision in nominal ARs



This deletion operation is reminiscent of Comparative Deletion. Comparative Deletion is a hallmark feature of comparative constructions like (27), which compare two quantities of the same sort of stuff (number of books, degrees of height, degrees of carefulness; Kennedy 1999, Kennedy and Merchant 2000).

- (27) a. Jill wrote more books than Sue read ⟨~~books~~⟩.  
b. The table is wider than chair is ⟨~~wide~~⟩.  
c. My sister drives as carefully as I drive ⟨~~carefully~~⟩.

What makes Comparative Deletion interesting is that it is obligatory *if and only if* there is identity between the two objects of the comparison. That is, when it comes to Comparative Deletion, you can only delete under identity, and if you can delete, you must.

- (28) a. Jill wrote more books than Sue read {\*books / magazines}.  
b. The table is wider than chair is {\*wide / tall}.  
c. My sister drives as carefully as I drive {\*carefully / recklessly}.

The parallel between (28) and (26) above is clear: in (26) elision is obligatory and it must happen under identity. But there is also an obvious difference: in comparatives, comparison is possible when the objects that are being compared are different; in such cases, deletion simply does not take place. However, this is not a possibility for nominal ARs, as illustrated in (29).

- (29) a. \*las manzanas que trajo Pedro manzanas  
the apples that brought Pedro apples  
b. \*las manzanas que trajo Pedro plátanos  
the apples that brought Pedro bananas

In nominal ARs, then, there are both (i) obligatory deletion under identity and (ii) obligatory identity of the objects of comparison.

**3.4.2.2.1 More deletion under identity** There is another corner of the Spanish grammar where a similar elision process as in nominal ARs seems to take place. This is in comparative constructions that are formed with the standard marker *de* (see Bruccart 1992b, Sáez and Sánchez López 2013, Mendia 2017). The following is an example:

- (30) Compré más libros de los que compraste tú.  
 bought more book.MS.PL of the.MS.PL that bought you  
 ‘I bought more books than (the books) you bought’

Typically, comparatives with *de* take a relative clause as their standard, as in (30), but it must be a relative clause with a “missing head”. This makes it a rather remarkable comparative construction, since it not only must there be elision, but the construction is ungrammatical if the head of the relative clause does not match the restriction of the comparative quantifier *más* (“more”).

- (31) a. \*Compré más **libros** de los **cómics** que compraste tú  
 bought more book.MS.PL of the.MS.PL comic.MS.PL that bought you  
 b. \*Compré más **libros** de los **libros** que compraste tú  
 bought more books of the.MS.PL book.MS.PL that bought you

There is, to my knowledge, no satisfactory explanation for why this should be so. But, whatever elision process drives the restrictions on *de* comparatives in Spanish, it seems to be exactly the same we observe in (26). I will take it then, that the elision of (26) is part of a general process that is visible in other constructions.

**3.4.2.2.2 Pronouncing different copies** The fact that we have two copies in the construction in (26) raises the question as to whether there is optionality about which one of the copies may be pronounced. In the case of nominal ARs, this optionality is not available in modern Spanish, as shown in (32).



- (32) \*las que trajo Pedro manzanas  
 the that brought Pedro apples

But there are indications that this was not always so. The following is an example from the 16<sup>th</sup> century by Teresa of Ávila.<sup>9</sup>

- (33) Mas no le da licencia que reparta la fruta, hasta que él esté tan fuerte con  
lo que ha comido de ella...

‘But He doesn’t give (her) permission to distribute fruit until she is strong from what (fruit) she has eaten.’

The interest of the previous passage lies in the free relative *lo que ha comido de ella* (lit. “what has eaten of it.FM”), where *ella* (“she”) is a nominal referring to *fruta* (“fruit”). That is, this is a nominal AR—it refers to an amount of fruits, not to any particular fruits—where the higher copy of the Measure Phrase is realized. This is still quite not parallel to (26), since the presence of the neuter variant of the definite article suggests that there never was a nominal head inside the relative clause in the first clause. Nevertheless, the fact that it was possible to build an AMOUNT denoting *lo que* free relative that is modifying a subsequent nominal fits well with the syntactic account of nominal ARs suggested here. A tentative structural analysis of (33) may go as follows.

- (34) [<sub>MP</sub> [<sub>DP</sub> lo [<sub>CP</sub> [<sub>DP</sub> Op MANY ]<sub>i</sub> [ que ...t<sub>i</sub> ]]]] [ MEAS fruta ]]

A second case suggesting that the head of the Measure Phrase may be overt involves Degree Neuter Relatives. Degree Neuter Relatives are constructions similar to nominal ARs where the head of the relative clause is not nominal, but some gradable predicate.

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<sup>9</sup>Passage from *Libro de la vida*, by Santa Teresa de Jesús, in García López (ed.), 2015, Penguin Clásicos.

- (35) Juan no es lo alto que es Pedro  
 Juan not is the.NT tall that is Pedro  
 ‘Juan is not as tall as Pedro’

Foreshadowing the extension of the analysis proposed here to Degree Neuter Relatives, which will be the object of Chapter 5, notice that Degree Neuter Relatives also allow a word order where the gradable predicate is final.

- (36) Juan no es lo que es Pedro de alto  
 Juan not is the.NT that is Pedro of tall

At this point, one may wonder whether *alto* in (36) is really sitting in a higher Measure Phrase (or Adjective Phrase in this case), or whether it is simply a lower copy of the CP internal adjective that has been fronted. One argument in favor of the first option comes from the need to use the preposition *de* in (36). This preposition is obligatory in Spanish Measure Phrases:<sup>10</sup>

- (37) a. dos metros \*(de) { cable / largo }  
 two meters of wire long  
 b. dos kilos \*(de) { patatas / peso }  
 two kilos of potatoes weight

Like in (37), dropping the preposition from (36) results in ungrammaticality, as does fronting it together with the adjective.

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<sup>10</sup>This raises the question of why the preposition *de* cannot be overt in nominal ARs, as opposed to Degree Neuter Relatives and other Measure Phrases.

- (38) a. \*Juan no es lo que es Pedro alto  
 Juan not is the.NT that is Pedro tall
- b. \*Juan no es lo de alto que es Pedro  
 Juan not is the.NT of tall that is Pedro

The ungrammaticality above suggests that there is no place for a preposition inside the CP. As a consequence, the adjective *alto* in (36) must be outside the CP. This suggests that sentences like (35) must be taken to be genuinely ambiguous between two different syntactic parses, (39a) and (39b), but (39c) is not one of them.

- (39) a. ✓ *Pronounce CP internal higher copy*  
 $[_{MP} [_{DP} \text{lo} [_{CP} [_{DP} \text{Op alto}]_i [\text{que} \dots t_i]]]] [ \langle \text{alt}\theta \rangle ]$
- b. ✓ *Pronounce external copy*  
 $[_{MP} [_{DP} \text{lo} [_{CP} [_{DP} \text{Op} \langle \text{alt}\theta \rangle ]_i [\text{que} \dots t_i]]]] [ \text{de alto} ]$
- c. ✗ *Pronounce CP internal lower copy*  
 $[_{MP} [_{DP} \text{lo} [_{CP} [_{DP} \text{Op}]_i [\text{que} \dots \text{alto}]]]] [ \langle \text{alt}\theta \rangle ]$

Altogether, I take the outcome of this discussion to be that the elision pattern proposed in (26) for Measure Phrases containing nominal ARs is both not only possible, but also attested elsewhere in the language.

### 3.4.3 Step 3: The final touch

We are not quite done yet. We have a semantics for nominal ARs that intuitively give us the desired result, but which, being of type  $\langle et \rangle$ , cannot directly combine with predicates that take *e*-type arguments. For concreteness, consider (2c), repeated below.

- (40)  $[_{TP} \text{Juan} [_{VP} \text{trajo} [_{MP} \text{las manzanas que trajo Pedro}]]]$ .  
 Juan brought the apples that brought Pedro  
 ‘Juan brought the (amount of) apples that Pedro brought.’

In (2c), the matrix predicate is seeking for a type of argument that does not fit with the nominal AR. Luckily, this kind of mismatch is well studied, and there are a number of possibilities available.

For reasons that will become clear shortly, I favor the view where, rather than providing an argument to the main predicate, nominal ARs in Spanish semantically restrict its denotation. That is, instead of the predicate taking the object as its argument via Functional Application, they combine via Restrict (Chung and Ladusaw 2004).

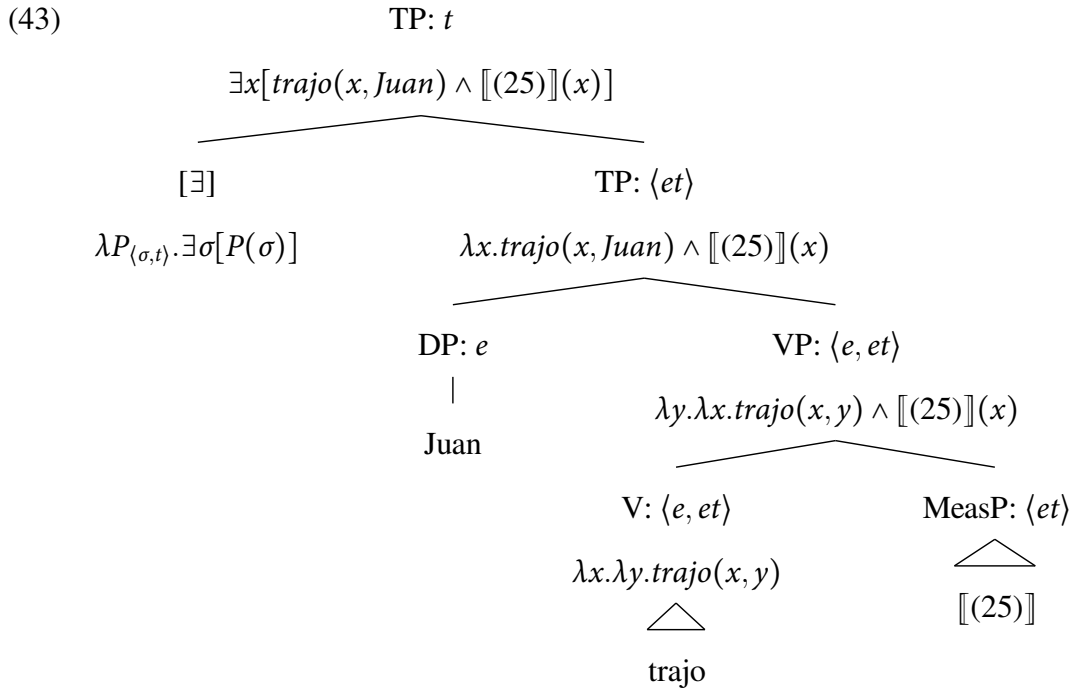
(41) **RESTRICT:**

If  $\alpha$  is a branching node,  $\{\beta, \gamma\}$  are the set of  $\alpha$ 's daughters, and  $\llbracket \beta \rrbracket = \lambda x_\sigma. \lambda y_\sigma. P(y, x)$ ,  $\llbracket \gamma \rrbracket = \lambda z_\sigma. Q(z)$ , then  $\llbracket \alpha \rrbracket = \lambda y_\sigma. \lambda x_\sigma. [P(y, x) \wedge Q(x)]$ .

This mode of composition has two main properties: (i) it does not saturate the argument slot of the verb and (ii) and it demotes the lambda term corresponding to the modified argument to the last position. That is, restricting a function  $f \in D_{\langle e, et \rangle}$  by a function  $g \in D_{\langle et \rangle}$  does not reduce the valency of  $f$ , and the resulting object is a function  $h \in D_{\langle e, et \rangle}$ . By adopting this mode of composition, we allow the semantic computation to proceed as if the object slot of the predicate were saturated, when in fact it is not. Existential closure at the TP level binds the remaining free variable, bringing its valency to zero. I represent this closure in the tree by means of the operator  $[\exists]$ .

(42)  $\llbracket [\exists] \rrbracket = \lambda P_{\langle \sigma, t \rangle}. \exists \sigma [P(\sigma)]$

The final steps in the derivation of (40) are represented below.



Let us examine the resulting interpretation: the full denotation of (40)–in (44) below–states that Juan brought apples in an amount  $d$ , where  $d$  is equal to the maximal amount of apples that Pedro brought.

$$\begin{aligned}
 (44) \quad \llbracket (40) \rrbracket &= \exists x[\text{trajo}(x, \text{Juan}) \wedge \text{manzanas}(x) \wedge \\
 &|x| = \text{MAX}(\lambda d. \exists z[\text{manzanas}(z) \wedge \text{trajo}(z, \text{Pedro}) \wedge |z| = d])]
 \end{aligned}$$

This is precisely the interpretation we are seeking.<sup>11</sup> Recall the three points in the desiderata of AMOUNT interpretations of relative clauses we discussed earlier (see §1.3.1 for discussion).

<sup>11</sup>The tree in (43) is somewhat of a simplification: nominal ARs take low scope with respect to negation:

- (i) Juan no trajo las manzanas que trajo Pedro.  $\neg > \exists; \exists \not> \neg$   
 Juan not bring the apples that brought Pedro  
 ‘Juan didn’t bring the (amount of) apples that Pedro brought.’

This means that, in accordance with Restrict, nominal ARs must take low scope with respect to negation. In turn, this means that, in some cases at least, we will need to accordingly adjust the tree in (43), and either interpret existential closure lower or negation higher than TP.

(4) **Desiderata for AMOUNT interpretations**

- a. *Definiteness*: AMOUNT interpretations refer to a definite amount.
- b. *Indefiniteness*: The head of the relative clause is interpreted as an indefinite.
- c. *Identity*: AMOUNT interpretations require a comparison of two amounts of same stuff.

The analysis presented here achieves all three points above. First, maximalization at the degree level is obtained by virtue of constructing a free relative headed by the definite article that denotes a maximal degree of something. The indefiniteness nominal ARs is guaranteed by taking them to be simple NPs modified by a Measure Phrase. Finally, the two distinct copies of the nominal head that are required to establish the equation between the two relevant degrees is granted by assuming a particular kind of deletion under identity process, independently existent in the language.

In practice, the semantics in (44) provides nominal ARs an interpretation identical to the paraphrases below, which is in line with speakers' intuitions.<sup>12</sup>

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<sup>12</sup>The LF in (44) has the meaning of an equative, so one might wonder if it shares other interpretive parallels with genuine equatives (like *as many as*). For instance, equatives are notorious for receiving both "at least" and "exactly" interpretations.

- (i) Liz is as tall a Bill is...
  - a. ...so you were wrong to say that she is taller. ["exactly"]
  - b. ...in fact, she's taller. ["at least"]

We see that in this respect, nominal ARs are the same.

- (ii) Pedro ha escrito los libros que escribió Tolstoy...  
Pedro aux written the books that wrote Tolstoy...  
'Pedro has written the books that Tolstoy wrote...'
  - a. ...so you were wrong to say that he wrote more. ["exactly"]
  - b. ...in fact, he wrote more. ["at least"]

The precise mechanisms by which we arrive at the weak readings for equatives is debated. For Horn (1972), Soames (1982) and Russell (2006) a.o. they should be understood as scalar implicatures, whereas Cresswell (1976), von Stechow (1984) and Schwarzschild and Wilkinson (2002) a.o. locate the source of the ambiguity at the lexical level. The takeaway is that, whatever theory we pick about equatives, one can apply it to ARs as well.

- (45) a. Juan brought apples in the amount that Pedro brought apples.  
 b. Juan brought apples in that amount.  
 [where *that amount* refers to *the amount of apples that Pedro brought*]

### 3.5 Discussion

#### 3.5.1 Impossible meanings

Recall the discussion in §3.2.2 about the impossibility of identity of AMOUNT interpretations in the following contexts:

(2b) **SV inversion**

Pedro ha escrito los libros que escribió Tolstoy.

Pedro aux written the books that wrote Tolstoy

‘Pedro has written the books that Tolstoy wrote.’

(11) **No SV inversion**

Pedro ha escrito los libros que Tolstoy escribió.

Pedro aux written the books that wrote Tolstoy

‘Pedro has written the books that Tolstoy wrote.’

The contrast between the two sentences is that, although both allow nominal AR interpretations (as in (46b)), only (2b) accepts (46a)).

- (46) a. Pedro has written down the number corresponding to the number of books that Tolstoy wrote.  
 [True *iff* Pedro wrote down the number 12]
- b. Pedro has written the same number of books that Tolstoy wrote.  
 [True *iff* Pedro wrote any 12 books]

The naive answer to why (11) lacks a meaning like (46b) is that it is simply not a subordinate question, i.e. it is not a propositional AR. And yet, it is possible to interpret (11) as a concealed question, which would result in an identity of OBJECT question interpretation. The puzzle, then, is: why is it not possible to have AMOUNT concealed questions? After all, these are identity questions as well, only about a number or amount, rather than an individual.<sup>13</sup> This possibility is further discussed in detail in §4.5 of Chapter §4: by defining a type shifter that takes as an input a definite description of a degree (or an “amount concept”, of type  $\langle sd \rangle$ ), we can extract a set of propositions equivalent to the denotation of a question like *what is the cardinality of books that Tolstoy wrote?*. This would result in the identity of AMOUNT interpretation, a question not about individual books, but about amounts of books.

The absence of this interpretation for (11) receives a straightforward explanation under the analysis presented in this chapter: although nominal ARs denote definite descriptions, the full Measure Phrase does not, it denotes a property of individuals. Given the semantics of the pair of type-shifters discussed in §4.5, the indefinite meaning of the Measure Phrase is of the wrong type. The difficulties to define type-shifters of the required type is discussed in Nathan (2006) and Frana (2017). But even if we defined a suitable type-shifter that allowed indefinite concealed question, we would face an overgeneration issue, for AMOUNT interpretations can only arise in the presence of the definite article. My analysis provides one way of ruling out this option, as is desired.

### 3.5.2 Why Restrict?

In the previous section I suggested that the Measure Phrase and the verbal predicate combined via Restrict. There are, I believe, good reasons for doing so instead of any of the other type-shifting or valency-reducing operations in the market. For instance, resolving the type mismatch using the  $\iota$ -operator would not work, since we need nominal ARs to be indefinites.

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<sup>13</sup>Recall that concealed questions can only be identity questions (Nathan 2006).



Introducing an  $\iota$ -operator in the structure would furthermore lead to a presupposition failure (see §1.4.3).

One of the signatures of nominals combining via Restrict is that they must always take lowest scope with respect to other sentential operators (e.g. Chung and Ladusaw 2004, McNally 2004 a.o.). Usually, indefinites may combine via Restrict, but not just any indefinite may. This is visible when we look at the scopal properties of different indefinites: in (47) below, only (47a) may scope above the matrix predicate *want*.

- (47) a. Lisa wants to bring an apple. [✓*want* > ∃; ✓∃ > *want*]  
 b. Lisa wants to bring apples. [✓*want* > ∃; ✗∃ > *want*]  
 c. Lisa wants to bring that amount of apples. [✓*want* > ∃; ✗∃ > *want*]

The same is true of nominal AR in Spanish: the nominal AR rendition of (47) is also scopeless (under its AMOUNT interpretation, of course).

- (48) Lisa quiere traer las manzanas que trajo Pedro. [✓*want* > ∃; ✗∃ > *want*]  
 Lisa wants bring the apples that brought Pedro

This property eliminates the possibility of introducing other type-shifters. For instance, another independently motivated way to deal with attributive DPs such as nominal ARs is to assume a null existential determiner, which effectively lifts the type of the nominal ARs to a generalized quantifier type  $\langle\langle et, t \rangle\rangle$ .<sup>14</sup> This option is perfectly plausible for bare plurals and mass nouns in general, which are very close to the final denotation of nominal ARs (cf. Chierchia 1998a, Dayal 2004). But this strategy requires the nominal AR to QR at LF, thereby predicting scope interactions like the one in (47a).

A second argument in favor of Restrict in Spanish nominal ARs comes from existential sentences. Nominals combining via Restrict are compatible with existential constructions

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<sup>14</sup>For example:  $[[\emptyset_D]] = \lambda P_{\langle et \rangle} . \lambda Q_{\langle et \rangle} . \exists x [P(x) \wedge Q(x)]$ .

with the copulative verb *haber*. As López (2012) extensively argues, these objects must be (semantically) incorporated to *haber*. This is shown in (49), where only the bare plural variant in (49a) is grammatical.

- (49) a. Hay hombres  
           be man.MS.PL  
           ‘There are men’
- b. \*Hay un hombre [ungrammatical without a locative coda]  
           be a.MS.SG man.MS.SG  
           ‘There is a man’
- c. \*Hay los hombres  
           be the.MS.PL man.MS.PL  
           ‘There is a man’

In general, definite DPs incur Definiteness Effects in this position (Milsark 1974, Carlson 1977a, a.o.), and Spanish is no different. What we find, however, is that definite DPs are indeed compatible with *haber* predicates, but only with KIND and AMOUNT interpretations.

- (50) Hay los libros que había en la mesa  
           be the book that were on the table  
           ‘There are the (kind/amount of) books that there were on the table’

This suggests that the definite DP headed by *los libros* is in fact an indefinite in disguise, which aligns with our expectations.

A remaining contender to Restrict is the type-shifter *nom* (or “ $\cap$ ”) from Chierchia 1984. In Chierchia’s (1984) system *nom* is the operation involved in transforming common nouns like *dog* into their bare plural form *dogs*. The type-shifter maps properties onto their entity-correlates only if these exist. Recently, Scontras (2017) has argued precisely for this type of

interpretation for the classifier noun *amount*; see §2.3. The data we have seen so far does not adjudicate between Restrict or *nom*.

One argument that speaks in favor of Restrict over *nom* is the inability of Spanish nominal ARs to be in subject position, something that follows from Restrict but is unexpected under *nom*. The relatives in (51) only admit an INDIVIDUAL restrictive interpretation, where the claim is about what individual friends came to the party, and not about how many friends came.

- (51) Los amigos que vinieron a mi fiesta vinieron a tu fiesta.  
the friends that came to my party came to your party  
'The friends that came to my party came to your party'

The lack of amount interpretation in (51) is not so surprising if the interpretation of nominal ARs relies on Restrict: it is well known that Restrict only very rarely affects subjects (see discussion in Werle 2000 on Lillooet, Chung and Ladusaw 2004 on Maori and Stvan 2009 on bare singular count nouns in English). There may be a number of explanations for such behavior. In Spanish, the reason could be simply that the parse with AMOUNT interpretations is unavailable by virtue of the high position in the structure where subjects have been argued to sit (Ordóñez 1997, Zagona 2002, a.o.). This position, usually a Topic Phrase, is higher than the locus of Existential Closure on TP.

We can reverse this situation, however. Example (52) below is just a variant of (51) with locative inversion, a construction where a locative PP is preposed and the logical subject appears postponed after the verb. There is good evidence suggesting that the locative PP is in [Spec,TP], or the usual position of subjects in the language (see Diercks 2014 for an overview and discussion of the arguments). Thus, the subject of (52) occupies a syntactic position analogous to direct objects in ordinary transitive sentences. The main difference between the two variants in (51) and (52) is that in the latter the AMOUNT interpretation is available.

- (52) A mi fiesta vinieron los amigos que vinieron a la tuya.  
 to my party came the friends that came to the yours  
 ‘To my party came the friends that came to your party’

It would be hard to account for the contrast between (51) and (52) by means of *nom*. It has been argued that Spanish is a language where *nom* is available both in subject and in object position (in fact, it has been proposed that Spanish lexicalizes *nom* as the definite article; see discussion in Chierchia 1998b and Dayal 2004), and so without further ado *nom* should be expected to resolve the type mismatch in (51) and yield an AMOUNT interpretation all the same. That this is not so argues in favor of Restrict instead.

### 3.5.3 Nominal ARs are not numerals

I have provided a semantics of nominal ARs that echoes the interpretation of numerals in Measure Phrases. Under this account, then, one could expect to find nominal ARs in places where numerals typically appear. This is not the case, however. Certain environments that accept numerals are incompatible with nominal ARs. Numerals in predicative positions are one such environment.

- (53) a. El número de planetas es ocho.  
 The number of planets is eight
- b. \*El número de planetas es los planetas que dibujó Juan.  
 The number of planets is the planets that painted Juan

Suppose that Juan painted eight planets. Since nominal ARs in Spanish are degree expressions similar to numerals, why is (53b) ungrammatical? I can only offer a speculative note here, leaving a deeper exploration of the issue for a further occasion. In the literature on the syntax of numeral expressions number words are commonly considered syntactic heads, not phrases, at least in some syntactic environments. On the contrary, nominal ARs can only be phrasal, they are full DPs. Thus, even if we concede that both objects, numerals and nominal ARs,

have denotations of the same type, this need not make them syntactically equivalent. My hope, then, is that whatever lies at the source of the contrast above can be attributed to the different syntactic make-up of the two expressions.

### 3.5.4 AMOUNTS with vs. without degrees

The main conclusion of this dissertation so far is that there are two formally distinct strategies in order to generate AMOUNT interpretations of relative clauses, and that the availability of each strategy is language dependent. Thus, while in English relative clauses can only express AMOUNTS via KIND interpretations, as argued in Chapter §2, this chapters shows that Spanish does possess a dedicated Amount Construction whose exclusive role is to provide AMOUNT interpretations. This is summarized below.

#### (54) Available strategies to generate AMOUNT interpretations by language

	AMOUNTS via KINDS	AMOUNT via degrees
Spanish	✓	✓
English	✓	✗

One prediction of (54) is that in Spanish it should be easier to find ARs in environments where English does not allow them, namely whenever the AMOUNTS as KINDS strategy is not available. This is something we have already seen above: in the example below, only the Spanish variant allows an AMOUNT interpretation, rendering the English translation false (see also §3.1).

(2b) Pedro ha escrito los libros que escribió Tolstoy.

Pedro aux written the books that wrote Tolstoy

‘Pedro has written the books that Tolstoy wrote.’

A further prediction of (54) is that we should see Spanish ARs showing opposed properties depending on whether they are derived by the degree-less or the degree-based strategy. More concretely, if a relative clause with an AMOUNT interpretation in Spanish allows a KIND interpretation, then it should also show the properties observed for English AMOUNT interpretations.

On the other hand, if a relative clause with an AMOUNT interpretation does not allow for a KIND interpretation, only the degree-based derivation is available. As a baseline, consider (2b) and (55) below.

(55) Perdimos la batalla porque no teníamos los soldados que tenía la Armada  
lost the battle because not have the soldiers that had the Army  
Imperial.

Imperial.

‘We lost the fight because we didn’t have the (amount of) soldiers that the Imperial Army had.’

As I show below, (2b)’s AMOUNT interpretation rests solely on the degree-based derivation, whereas (55) parallels its English counterpart and gets its AMOUNT interpretation via KINDS. The first indication in favor of this contrast, is that only (55) allows a KIND interpretation. That is, while (55) can be true if the reason for losing the battle was not having soldiers as well trained/motivated/strong as the Imperial Army had, (2b) is not be true even if Pedro wrote the same kind of books as Tolstoy (it only allows a false OBJECT interpretation and an AMOUNT interpretation).

The next step is to ascertain what happens if we drop the relative clause. In §2.2 we saw that English AMOUNT interpretations do not necessarily require a relative clause, and so they are available also with PP modifiers and with bare DPs. Thus, we expect that only variants of (55) in Spanish will allow AMOUNT interpretations in these cases. That this is the case is shown below.

(56) **PP modifier**

a. ✗<sub>AMOUNT</sub>

Pedro ha escrito los libros de Tolstoy.

Pedro aux written the books of Tolstoy

‘Pedro has written the books of Tolstoy.’

b. ✓<sub>AMOUNT</sub>

Perdimos la batalla porque no teníamos los soldados de la Armada  
lost the battle because not have the soldiers of the Army  
Imperial.  
Imperial.

‘We lost the fight because we didn’t have the (amount of) soldiers of the Imperial  
Army.’

(57) *Bare DP*

a. ✗<sub>AMOUNT</sub>

Pedro ha escrito los libros.  
Pedro aux written the books  
‘Pedro has written the books.’

b. ✓<sub>AMOUNT</sub>

Perdimos la batalla porque no teníamos los soldados.  
lost the battle because not have the soldiers.

‘We lost the fight because we didn’t have the (amount of) soldiers.’

Finally, we look at island-sensitivity. In §2.4.3 of Chapter 2 we saw that the English variants of examples like (55) do not seem to display the same type of island-sensitivity that other degree constructions do. The prediction, then, is that only Spanish examples like (2b) but not (55) will show this restriction. Below I show that this is the case with negative islands and factive islands (the baseline examples were provided in §1.4.1 of Chapter 1, here I only show the relevant contrasts).

(58) **Negative islands**

a. ✗<sub>AMOUNT</sub>

Pedro escribió los libros que Tolstoy no escribió.

Pedro wrote the books that Tolstoy not write

‘Pedro wrote some particular books that Tolstoy didn’t write.’

b. ✓<sub>AMOUNT</sub>

Ganamos la batalla porque teníamos los soldados que no tenía la Armada

won the battle because have the soldiers that not had the Army

Imperial.

Imperial.

‘We won the battle because we had the (amount of) soldiers that the Imperial Army didn’t have.’

(59) **Factives: response stance verbs**

a. ✗<sub>AMOUNT</sub>

Pedro escribió los libros que Juan admitió que Tolstoy escribió.

Pedro wrote the books that Juan admitted that Tolstoy written

‘Pedro wrote the books that Tolstoy didn’t write.’

b. ✓<sub>AMOUNT</sub>

Perdimos la batalla porque no teníamos los soldados que Juan admitió

lost the battle because not have the soldiers that Juan admitted

que la Armada Imperial tenía.

that the Army Imperial had.

‘We lost the battle because we didn’t have the (amount of) soldiers that Juan admitted that the Imperial Army had.’



(60) **Factives: *surprise***

a. ✗<sub>AMOUNT</sub>

Pedro escribió los libros que es sorprendente que Tolstoy escribiera.

Pedro wrote the books that is surprising that Tolstoy write.SUBJ

‘Pedro wrote the books that it was surprising that Tolstoy wrote.’

b. ✓<sub>AMOUNT</sub>

Perdimos la batalla porque no teníamos los soldados que es sorprendente

lost the battle because not have the soldiers that is surprising

que la Armada Imperial tuviera.

that the Army Imperial have.SUBJ.

‘We lost the battle because we didn’t have the (amount of) soldiers that it is surprising that the Imperial Army had.’

Altogether, these contrasts show that the predicted availability of the two different ways of getting at AMOUNTS is present in Spanish. In contrast, English only has access to the degree-less strategy described in Chapter 2.

### 3.6 Conclusion

In this chapter I have argued that Spanish possesses a mechanism to deliver amounts that is absent in English. The main source of the difference between the two languages rests on the availability in Spanish of relative clauses that denote definite descriptions of degrees (understood as maximalized sets of degrees), that can in turn be used as Measure Phrases.

The resulting state of affairs is one where natural languages allow two different strategies for deriving AMOUNT interpretations of relative clauses: a degree-based strategy and a degree-less strategy, where degree semantics does not come into play at all. While some languages like Spanish employ both strategies, languages like English only have the degree-less strategy.

## CHAPTER 4

### PROPOSITIONAL AMOUNT RELATIVES

This chapter looks at Amount Relatives in Spanish when they appear as complements to *wh*-embedding predicates, predicates that typically select for either interrogative or exclamative complements. I will refer to this type of Amount Relatives as Propositional Amount Relatives (propositional ARs henceforth). These constructions are puzzling as they seem to be DPs that are selected for by predicates that usually do not select nominal complements. The task of this chapter is to understand why these ARs have the distribution that they do, how sentences involving them receive their interpretation, and why analogous constructions do not exist in languages like English.

The chapter begins by looking into the general properties of propositional ARs in Spanish. In §4.1 it will be shown that propositional ARs have the external distribution and show other syntactic properties of *wh*-constructions like subordinate questions and exclamatives. Section 4.2 presents a syntactic analysis that tries to account for the “hybrid” nature of these propositional relatives by treating them as involving an interrogative core and a nominal functional layer above this interrogative CP. In §4.3 I present a compositional semantic analysis of this structure. Finally, an appendix is included where I discuss how, despite their superficial resemblance, propositional ARs should not be understood as concealed questions.

## 4.1 Properties of propositional ARs

### 4.1.1 Basic distribution

#### 4.1.1.1 Question embedding predicates

Spanish, unlike languages like English, allows ARs to be embedded under a great variety of *wh*-embedding predicates, like *wonder*, *ask*, *know*, *say*. etc. For ease of exposition, I will refer to the ARs that appear under such predicates as “propositional ARs”, as they appear where propositional expressions otherwise appear. These will be contrasted in §3 with “nominal ARs”, which serve as arguments to verbs requiring nominal complements. The following examples provide the basic paradigm, illustrating how two types of question embedding predicates, rogatives and responsives (Lahiri 2002), embed ARs. In (1) and (2), we see the typical distribution of subordinate questions, headed by a relative pronoun *qué* (“what”) and *cuánto* (“how many”).

#### (1) Rogative predicates

- a. Me pregunto { qué / cuántas } manzanas trajo Pedro.  
I.DAT wonder what how-many.FM.PL apples brought Pedro  
'I wonder {what/how many} apples Pedro brought'
- b. Me preguntó { qué / cuántas } manzanas trajo Pedro.  
I.DAT ask what how-many.FM.PL apples brought Pedro  
'He asked me {what/how many} apples Pedro brought'

#### (2) Responsive predicates

- a. Yo sé { qué / cuántas } manzanas trajo Pedro.  
I know what how-many.FM.PL apples brought Pedro  
'I know {what/how many} apples Pedro brought'

- b. Yo te dije { qué / cuántas } manzanas trajo Pedro.  
 I you said what how-many.FM.PL apples brought Pedro  
 ‘I told you {what/how many} apples Pedro brought’

Example (3) shows the distribution of propositional ARs, which parallels that of the subordinate questions in (1) and (2).

(3) **Amount Relatives with question embedding predicates**

a. *Rogative predicates*

- Me { pregunto / preguntó } las manzanas que trajo Pedro.  
 I.DAT wonder ask.3.SG the.FM.PL apples that brought Pedro  
 i. ‘I wonder {what/how many} apples Pedro brought’  
 ii. ‘He asked me {what/how many} apples Pedro brought’

b. *Responsive predicates*

- Yo { sé / dije } las manzanas que trajo Pedro.  
 I know said the.FM.PL apples that brought Pedro  
 ‘I {know / said} {what/how many} apples Pedro brought’

In addition to the target AMOUNT interpretation, the sentences can also be interpreted as involving an identity question—equivalent to what we called an OBJECT interpretation in §1.2.2 of the introduction. The two meanings are precisely the ones we see in the ordinary subordinate questions in (1) and (2).

Moreover, as shown in (4), neither subordinate questions nor propositional ARs may be embedded under anti-rogative verbs, i.e. verbs that take only declarative complements.

#### (4) **Anti-rogative predicates**

##### a. *Subordinate Questions*

\*Yo { creo / pienso / afirmo } { qué / cuántas } manzanas trajo

I believe think claim what how many.FM.PL apples brought

Pedro

Pedro

'I {believe/think/claim} {what/how many} apples Pedro brought'

##### b. *Amount Relatives*

\*Yo { creo / pienso / afirmo } las manzanas que trajo Pedro.

I believe think claim the.FM.PL apples that brought Juan

'I {believe / think / claim} that Juan brought *d*-many apples'

Thus, propositional ARs seem to behave like embedded questions (*i*) in having the same range of interpretations, (*ii*) in being able to appear under the same types of verbs and (*iii*) in being unable to appear under the same types of verbs.

#### **4.1.1.2 Exclamation embedding predicates**

In addition to rogative and responsive verbs, propositional ARs can also occur with predicates that take exclamative complements. These include emotive predicates such as *surprise*, *be amazing* and other emotive locutions like *tienes que ver* ("you should see"). These predicates come in two syntactic frames: the post-verbal subject frame and the impersonal frame. In the first case, the subject of the emotive predicate must follow the predicate, yielding a VS word order, rather than the canonical SV. The exclamative and propositional AR variants in this frame are given in (5a) and (5b) respectively.

(5) **Post-verbal subjects**

a. Me sorprendió { qué / cuántas } manzanas trajo Pedro.

I.DAT surprised what how many.FM.PL apples brought Pedro

‘It surprised me {what/how many} apples Pedro brought’

b. Me sorprendió las manzanas que trajo Pedro

I.DAT surprised the.FM.PL apples that brought Pedro.

‘It surprised me the apples that Pedro brought’

A couple of notes are required about (5b). First, observe that there is an agreement mismatch between the matrix predicate and the DP; usually, Spanish requires subject arguments to agree with the verb in PERSON and NUMBER, but this is not observed in (5b). This agreement mismatch is studied in detail in §4.1.3.2. For the moment, it suffices to note that this is a property of propositional ARs that comes in handy to tease them apart from ordinary DPs (see §4.1.3.2 and the minimal pair (31) below). Second, just like in its English translation, the interpretation of (5b) is vague, and what surprised the speaker about the apples could be almost anything: that there were many apples, that they were big, that they were Fuji apples, etc. This is also true of the *qué* variant of (5a). (The *cuánto* variant is straightforward and uniformly refers to the amount of apples.)

Both subordinate exclamations (6a) and propositional ARs (6b) may appear in the impersonal frame as well. As in the post-verbal case, the *qué* variant of (6a) and the propositional AR in (6b) are vague with respect to the object of the emotive attitude.

(6) **Impersonal**

a. Es sorprendente { qué / cuántas } manzanas trajo Juan.

is surprising what how many.FM.PL apples brought Juan

‘It is surprising how many apples Juan brought’

- b. Es sorprendente las manzanas que trajo Juan.  
 is surprising the.FM.PL apples that brought Juan  
 ‘It is surprising the apples that Juan brought’

#### 4.1.1.3 Ambiguities between questions and exclamations

There are environments that allow for both interrogative and exclamative complements, sometimes leading to ambiguity as to the interpretation of the sentence as a whole. Consider, for instance, the following sentence (from Gutiérrez-Rexach 1996).

- (7) Bill found out how rich my parents are.  
 a. Bill found out exactly how much money my parents have.  
 b. Bill found out that my parents are much richer than (he) expected.

Sentence (7) may be interpreted as a subordinate question, where the speaker asserts that Bill knows the (true) answer to the relevant question, (7a). But interpreted as an exclamative, (7) describes an emotive attitude that holds between Bill and a proposition of the form *my parents are d-rich*, (7b).

Propositional ARs may be embedded in similar environments as well, and give rise to the same sort of ambiguities.

- (8) No sabes las manzanas que trajo Pedro el año pasado.  
 not know.2.SG the.FM.PL apples that brought Pedro the last year  
 Lit.: ‘You don’t know the apples that Pedro brought last year.’

The sentence in (8) may be interpreted as a subordinate OBJECT or AMOUNT question, as in (9a)/(9b). The same sentences, however, can be used exclamatively as well, expressing that the apples that Pedro brought last year exceeded the speaker’s expectations, either with respect to some property of the particular apples, (9c) or with respect to the amount of apples that were brought (9d).

(9) a. *Subordinate* OBJECT *interrogative*

You don't know what are the apples that Pedro brought last year.

b. *Subordinate* AMOUNT *interrogative*

You don't know what is the amount of apples that Pedro brought last year.

c. *Subordinate* OBJECT *exclamative*

The amount of apples that Pedro brought last year exceeded the expectations of the speaker with respect to some property of apples.

d. *Subordinate* AMOUNT *exclamative*

The amount of apples that Pedro brought last year exceeded the expectations of the speaker.

Furthermore, as first discussed by Elliot (1971), exclamatives are factive and therefore incompatible with speaker ignorance regarding the content of the expression. In keeping with this observation, the exclamative use of propositional ARs is not allowed when the speaker must be taken to be ignorant, as in (10).

(10) No sé            las            manzanas que trajo    Pedro el    año pasado.

not know.1.SG the.FM.PL apples    that brought Pedro the last year

'I don't know {what/how many} apples Pedro brought last year'

For good measure, it is worth observing that the pattern is identical for sentences with overt *wh*-pronouns:

(11) No sé            { qué / cuántas            } manzanas trajo    Pedro.

not know.1.SG    what    how-many.FM.PL    apples    brought Pedro

'I don't know {what/how many} apples Pedro brought'



So, as the last two sections have shown, the wide range of interpretations allowed by propositional ARs follows closely the interpretation of *bona fide* subordinate questions and exclamatives. Similarly, both types of construction are confined to be the syntactic environments.

#### 4.1.2 Constraints on propositional ARs

##### 4.1.2.1 Restrictions on the determiner

Recall from the introductory that ARs obligatorily co-occur with the definite article (Carlson 1977a). Spanish propositional ARs are subject to the same restriction. In general, any attempt to construct a propositional AR with a determiner other than the definite article results in ungrammaticality.

- (12) a. \*Me pregunto { algunas / muchas / dos } manzanas que trajo Pedro.  
 I.DAT wonder some many two apples that brought Pedro  
 ‘I wonder {some / many / two} apples that Pedro brought’
- b. \*Sé { algunas / muchas / dos } manzanas que trajo Pedro.  
 know some many two apples that brought Pedro  
 ‘I wonder {some / many / two} apples that Pedro brought’
- c. \*Es sorprendente { algunas / muchas / dos } manzanas que trajo Pedro.  
 is surprising some many two applesm that brought Pedro  
 ‘It is surprising {some / many / two} apples that Pedro brought’

This is true even of cases like (13), where the definite article is present, but further modified by the universal quantifier *all*. The attempts below are ungrammatical.<sup>1</sup>

- (13) a. \*Yo me pregunto todas las manzanas que trajo Pedro.  
 I I.DAT wonder all.FM.PL D.FM.PL apples that brought Pedro  
 Lit.: ‘I wonder all the apples that Juan brought’

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<sup>1</sup>The sentence in (13b) can be marginally acceptable under an acquaintance interpretation of the verb *know*.

- b. \*Yo sé todas las manzanas que trajo Pedro.  
 I know all.FM.PL D.FM.PL apples that brought Pedro  
 Lit.: 'I know all the apples that Pedro brought'

#### 4.1.2.2 Obligatoriness of the relative clause

A second constraint on propositional ARs is that the relative clause is obligatory. Unmodified definite DPs are not usually grammatical as complements of rogative predicates—with the exception of some “functional” nouns like *price*, *time*, etc. (Nathan 2006). Under responsive predicates some speakers may allow a concealed question interpretation, but the AMOUNT interpretation is absent.<sup>2</sup>

- (14) a. \*Yo me pregunto las manzanas.  
 I I.DAT wonder the.FM.PL apples
- b. ?Yo sé las manzanas.  
 I know the.FM.PL apples  
 'I know which ones are the (relevant) apples'

Recall from (5b) that propositional ARs allow an agreement mismatch when they appear as post-verbal subjects of emotive predicates. Even if we keep these properties the same, with the goal that the AMOUNT reading is facilitated and the OBJECT reading disallowed, dropping the relative clause results in ungrammaticality all the same.

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<sup>2</sup>The same is true of other, such as reduced relatives clauses, participial phrases, etc.:

- (i) a. \*Yo me pregunto las manzanas traídas por Juan.  
 I I.DAT wonder the.FM.PL apples brought by Juan
- b. \*Yo me pregunto las personas jugando a poker.  
 I I.DAT wonder the.FM.PL people playing poker

(15) \*Me sorprendió las manzanas  
I.DAT surprised the.FM.PL apples

On the variant where the subject nominal and matrix verb agree, the resulting sentence is grammatical but lacks an AMOUNT interpretation. The sentences in (16) simply states that the apples themselves, not the quantity of them, were the source of surprise.

- (16) a. Me sorprendieron las manzanas.  
I.DAT surprised.3.SG the.FM.PL apples  
'The apples surprised me.'
- b. Me sorprendieron las manzanas de Juan.  
I.DAT surprised.3.SG the.FM.PL apples of Juan  
'Juan's apples surprised me.'

This property of propositional ARs is in stark contrast with the ARs usually discussed in the literature, where the role otherwise played by the relative clause can be supplied by a rich enough context (see §2.2.2 in Chapter 2). In both English and Spanish, sentences like (17) may convey an AMOUNT reading.

- (17) a. We lost because we didn't have the soldiers {(of the enemy) / (that the enemy had).}
- b. Perdimos la batalla porque no teníamos los soldados (que nuestro enemigo  
lost the battle because not have the soldiers that our enemy  
tenía).  
had

I leave the discussion of further differences between Spanish propositional ARs and nominal ARs in Spanish as well as English for Chapters 3 and 2 respectively.

### 4.1.3 Further syntactic properties of propositional ARs

A number of additional syntactic properties of propositional ARs lead us to the conclusion that they are not ordinary nominal modified by restrictive relative clauses. In many respects, propositional ARs fail to show properties of ordinary DPs in Spanish and instead bear the hallmarks of *wh*-constructions, like subordinate interrogatives and exclamatives. In this section, I discuss five syntactic properties of propositional ARs that differentiate them from surface identical DPs involving relative clauses and other definite DPs like free relatives.

#### 4.1.3.1 Subject Verb inversion

In Spanish, the canonical word order is SVO. However, Subject Verb inversion is a common, optional process, and in many environments subjects may vary freely between preverbal and postverbal positions.

##### (18) Declarative sentences

- a. Hoy Juan ha traído las manzanas.  
today Juan aux. brought the apples  
'Today Juan brought the apples'
- b. Hoy ha traído Juan las manzanas.

However, there are a number of constructions where SV inversion is obligatory (see Torrego 1984, Suñer 1994, Barbosa 2001 a.o.). The blueprint of such cases is that they all involve movement of some operator—usually *wh*-operators, but also focus—to the left periphery of the clause. This is illustrated by the examples in (19) through (23).

##### (19) Matrix *wh*-questions

- a. { Qué / Cuántas manzanas } ha traído Juan?  
what / how many apples aux. brought Juan  
'{What / How many apples} did Juan bring?'

b.\* { Qué / Cuántas manzanas } Juan ha traído?

(20) **Matrix exclamatives**

a. { Lo / Cuántas manzanas } que ha traído Juan!  
the.NT how many apples that aux. brought Juan  
'{The things / How many apples} Juan has brought!'

b.\* { Lo / Cuántas manzanas } que Juan ha traído!

(21) **Embedded *wh*-questions**

a. Me pregunto { qué / cuántas manzanas } ha traído Juan.  
I wonder what / how many apples aux. brought Juan  
'I wonder {what / how many apples} Juan brought.'

b.\* Me pregunto { qué / cuántas manzanas } Juan ha traído?

(22) **Embedded exclamatives**

a. Es sorprendente { lo que / cuántas manzanas } ha traído Juan.  
is surprising what / how many apples aux. brought Juan  
'It is surprising {what / how many apples} Juan has brought.'

b.\* Es sorprendente { lo que / cuántas manzanas } Juan ha traído.

(23) **Focus fronting**

a. Manzanas ha traído Juan, no plátanos.  
apples aux. brought Juan, not bananas  
'Apples has brought Juan, not bananas.'

b.\* Manzanas Juan ha traído, no plátanos.

Notice however, that A-bar movement to the left-periphery is not enough to trigger obligatory inversion. As shown in (24)–(26), there are movement constructions—including headed and free relatives as well as topicalization—where inversion is only optional.

(24) **Relative clauses**

- a. Las manzanas que ha traído Juan.  
the apples that aux. brought Juan  
'The apples that Juan brought.'
- b. Las manzanas que Juan ha traído.

(25) **Topic fronting**

- a. El Quijote lo ha leído Juan.  
the Quixote it aux. read Juan  
'Don Quixote Juan has read.'
- b. El Quijote Juan lo ha leído.

(26) **Free Relatives**

- a. Juan ha comido lo que ha preparado Pedro.  
Juan aux. eaten the that aux. cooked Pedro  
'Juan has eaten what Pedro has cooked'
- b. Juan ha comido lo que Pedro ha preparado.

One generalization about when inversion is required versus not is due to Rizzi (1997), who argues that inversion must take place whenever there is an operator-variable chain.

(27) **THE INVERSION GENERALIZATION**

Inversion is obligatory if the clause in question contains an operator-variable chain.

For Rizzi, *wh*-words and focus are quantificational, unlike relative operators (which move and merely trigger abstraction in a Heim and Kratzer 1998-style system) and topics (where the value of the trace or lower copy is identical to the topic phrase and thus, the same across all evaluations).<sup>3</sup>

Regardless of the possible analyses that may account for this generalization, what is important for our purposes is that SV inversion provides a good diagnostic of operator-variable chains, understood *à la* Rizzi. With respect to movement constructions at large, the data in (19) through (26) suggest a nominal/clausal divide: SV inversion seems to be obligatory those constructions that are clausal in nature (interrogatives and exclamatives), whereas it does not seem to be required with relative clauses and free relatives, both of which are nominal—in the sense that their distribution follows more closely that of ordinary nominal phrases. This property of SV inversion makes it a good test to probe the underlying syntactic properties of propositional ARs. If inversion is optional in propositional ARs, this would lend support to a view on which they share a common core with ordinary relative clauses yielding an OBJECT (intersective) interpretation. On the other hand, if inversion is obligatory, this would suggest that propositional ARs have a syntactic makeup that is categorically different from such nominals, and that they have a common underlying structure as *wh*-constructions.

Turning now to propositional ARs, they require inversion across different types of embedding predicates, as shown below with rogative (28a), responsive (28b) and emotive factive predicates (28c) (Plann 1984).

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<sup>3</sup>The author considers quantificational those phrases that make use of not just one, but a range of values that get assigned to a variable (the trace of the focused constituent that has been fronted), and where calculating the meaning of such chain requires reference to evaluations at different values. This is true of both *wh*-operators and focus. In turn, by claiming that topic is not quantificational, Rizzi assumes that the value which the trace gets in the interpretation of the chain is invariable, since it receives the same value across all evaluations (i.e. it is still assigned a value by the topic phrase, but that value remains constant). Rizzi (1997, 2004) refers to traces of this kind as null constants.

(28) **Propositional ARs**

a. Me pregunto las manzanas que { comió Pedro / \*Pedro comió }.

I.DAT wonder the.FM.PL apples that ate Pedro

'I wonder {what/how many} apples Pedro ate'

b. Me dijo las manzanas que { comió Pedro / \*Pedro comió }.

I.DAT say the.FM.PL apples that ate Pedro

'She told me {what/how many} apples Pedro ate'

c. Me sorprendió las manzanas que { comió Pedro / \*Pedro comió }.

I.DAT surprised.3.SG D.FM.PL apples that ate Pedro

'It surprised me the (amount of) apples that Pedro ate'

For completeness, (29) shows that SV inversion is also required in nominal matrix exclamatives, which are also ambiguous between OBJECT and AMOUNT interpretations.

(29) Las manzanas que { comió Pedro / \*Pedro comió }!

the apples that ate Pedro

'The apples that Pedro ate!'

**4.1.3.2 Agreement**

In Spanish, nominative subject arguments must agree with the verb in person and number, whether pre- or post- verbal. Failure to agree results in ungrammaticality, as shown by the contrast in (30).

(30) a. Me sorprendieron mis amigos.

I.DAT surprised.3.PL I.POSS.PL friends

'My friends surprised me'



b. \*Me sorprendió mis amigos.  
I.DAT surprised.3.SG I.POSS.PL friends

Consider now the minimal pair in (31).

- (31) a. Me sorprendió los amigos que invitó Pedro.  
I.DAT surprised.3.SG the.MS.PL friends that invited Pedro  
'It surprised me {what/how many} friends that Pedro invited'
- b. Me sorprendieron los amigos que invitó Pedro.  
I.DAT surprised.3.PL the.MS.PL friends that invited Pedro  
'The friends that invited Pedro surprised me'

At first blush, the difference in agreement pattern between (31a) and (31b) may suggest that agreement is optional with these emotive predicates. However, as the translations indicate, these two sentences are not semantically equivalent. Only (31a) has an AMOUNT interpretation, and thus is a propositional AR. Crucially, in (31a), the verb does not seem to be agreeing with the noun *amigos* ("friends"). What we have, at least superficially, is an agreement mismatch (see also Torrego 1988, Campos 1993, Bruccart 2003).

Similar facts obtain in other types of propositional ARs. For instance, *plurale tantum* terms in Spanish always trigger plural agreement irrespective of their number interpretation. But when they form propositional ARs and the relative clause receives an AMOUNT interpretation, the verb can be marked singular, against expectations (32a). When the interpretation is not about an amount, plural agreement resurfaces, as shown in (32b).

- (32) a. Me sorprendió los víveres que trajo Pedro.  
I.DAT surprised.3.SG the.MS.PL supplies that brought Pedro  
'It surprised me {what/how many} supplies Pedro brought'

- b. Me sorprendi**éron** los víveres que trajo Pedro.  
 I.DAT surprised.3.PL the.MS.PL supplies that brought Pedro  
 ‘The supplies that Pedro brought surprised me’

We find similar agreement mismatches with psychological predicates with experiencer subjects, like *olvidar* (“forget”). The subject of such verbs are marked dative, and since dative arguments in Spanish cannot be targeted for agreement, the verb instead agrees with the object. The basic facts, in (33), show that the verb agrees with the object, and failure to agree with the object, as in (33b), results in ungrammaticality.

(33) **Agreement pattern with DPs**

- a. Se me han olvidado los libros  
 refl I.DAT AUX.3.PL forgotten the.MS.PL books  
 ‘I forgot the books’
- b. \*Se me ha olvidado los libros  
 refl I.DAT AUX.3.SG forgotten the.MS.PL books

When *olvidar* takes a clausal complement, however, the verb bears default agreement (33), presumably because clauses are not  $\varphi$ -feature bearers in Spanish (cf. Halpert 2015).

(34) **Agreement pattern with clauses**

- a. \*Se me han olvidado { qué / cuántos } libros leyó Juan  
 refl I.DAT AUX.3.PL forgotten what how many.MS.PL book.MS.PL read Juan  
 ‘I forgot {what/how many} books Juan read’
- b. Se me ha olvidado { qué / cuántos } libros leyó Juan  
 refl I.DAT AUX.3.SG forgotten what how many book.MS.PL read Juan  
 ‘I forgot {what/how many} books Juan read’

Let us now turn to propositional ARs when they occur as the object of such subject experiencer verbs. As we see in (35), only the non-agreeing variant in (35b) has an AMOUNT interpretation.

- (35) a. Se le han olvidado los mejillones que ha pedido Juan.  
 refl PR.DAT AUX.3.PL forget the.MS.PL mussel.MS.PL that aux. ordered Juan  
 ‘He has forgotten the mussels that John ordered’ [restrictive RC]  
 #‘He has forgotten how many mussels John ordered’ [AR]
- b. Se le ha olvidado los mejillones que ha pedido Juan.  
 refl PR.DAT AUX.3.SG forget the.MS.PL mussel.MS.PL that aux. ordered Juan  
 #‘He has forgotten the mussels that John ordered’ [restrictive RC]  
 ‘He has forgotten how many mussels John ordered’ [AR]

A final note on these agreement facts. One could think that the presence of the relevant [sg]  $\varphi$ -features on the matrix predicate is due to an elided classifier noun *cantidad* (“quantity”), as represented in (36) below.

- (36) { Me pregunto / sé } la ⟨cantidad-de⟩ manzanas que trajo Pedro.  
 I.DAT wonder know the.SG amount of apples.PL that  
 ‘I {wonder / know} (what is) the amount of apples that Pedro brought’

The first issue with this idea is that *cantidad de* is not a constituent, and so it should not be targeted by ellipsis (e.g. Merchant 2013 a.o.). This is shown by other cases of NP-ellipsis where, in configurations like the one in (36), the elision never targets the preposition *de*.

- (37) a. He cogido [<sub>DP</sub> las ⟨gafas⟩ de Pedro ]  
 aux. taken the.SG glasses of Pedro  
 ‘I have taken Pedro’s glasses’
- b. \*He cogido [<sub>DP</sub> las ⟨gafas-de⟩ Pedro ]

Moreover, Spanish does have an elliptical construction like (36) where *cantidad* is elided, but in these cases too the preposition must remain, as illustrated by the contrasts in (38).

(38) a. { Me sorprendió / Es sorprendente } la ~~cantidad.FM.SG~~ de  
 I.DAT surprised is surprising the.FM.SG of  
 plátanos que trajo Juan  
 banana.MS.PL that brought Juan

‘It {surprised me / is surprising} the amount of bananas that Juan brought’

b.\* { Me sorprendió / Es sorprendente } la ~~cantidad.FM.SG de~~ plátanos que trajo  
 Juan

Finally, there are important differences between (36) and its overt variant that, again, would be difficult to account if the former were derived from the latter. For one, overt *cantidad de* does not require a relative clause, as shown below.

(39) a. Me sorprendió la cantidad de manzanas.  
 I.DAT surprised.3.SG the.FM.SG amount of apples

b. Me sorprendió la cantidad de manzanas de Juan.  
 I.DAT surprised.3.SG the.FM.SG amount of apples of Juan

c. Me sorprendió esa cantidad de manzanas.  
 I.DAT surprised.3.SG that.FM.SG amount of apples

And second, unlike propositional ARs, the overt counterpart of (36) cannot be embedded by question embedding predicates, suggesting that it is a different type of construction altogether.

(40) \*Yo { me pregunto / sé } la de plátanos que trajo Juan.  
 I I.DAT wonder know the.FM.SG of banana.MS.PL that brought Juan

I take it, then, that the agreement patterns reported above cannot be successfully accounted for by alluding to hidden/null material in the relative clause.

Before I conclude the section, let us see how the two properties of propositional ARs we have seen so far hang together. In (31), for instance, the two examples—the agreeing and the non-agreeing variants—were introduced with SV inversion. Thus, given the distribution of propositional ARs reviewed in this section, we would expect that the ordinary SV word order is compatible only with the agreeing variant. This is exactly what we find:

- (41) a. Me sorprendieron los amigos que Pedro invitó.  
 I.DAT surprised.3.PL the.MS.PL friends that Pedro invited  
 ‘The friends that invited Pedro surprised me.’
- b. \*Me sorprendió los amigos que Pedro invitó.  
 I.DAT surprised.3.SG the.MS.PL friends that Pedro invited

The same is true of the examples in (35): the canonical SV order is compatible only with agreeing variants of the relative clause.

- (42) a. Se le han olvidado los mejillones que Juan ha pedido.  
 refl PR.DAT aux.3.PL forget the.MS.PL mussel.MS.PL that aux. ordered Juan  
 ‘He has forgotten how many mussels John ordered.’
- b. \*Se le ha olvidado los mejillones que Juan ha pedido.  
 refl PR.DAT aux.3.SG forget the.MS.PL mussel.MS.PL that Juan aux. ordered

#### 4.1.3.3 Pre- vs. post-verbal clausal subjects

Propositional ARs pattern with interrogatives/exclamatives and unlike ordinary DPs with restrictive relative clauses in certain positional constraints they are subject to. In Spanish, only certain types of clauses can appear in the preverbal subject position, and embedded interrogatives and exclamatives are not among these. Subject interrogatives/exclamatives uniformly appear in the post-verbal position. On the other hand, DPs, including concealed questions, are not subject to this restriction and can occur in both pre and post-verbal subject positions. As

illustration, consider the contrast between (43a) and (43b): though the sentences are intended to convey the same meaning, only (43b), involving a concealed question, is grammatical.

- (43) a. *Preverbal interrogative*  
\*Qué hora era me sorprendió  
what time is me surprised  
'What the time is surprised me'
- b. *Preverbal concealed question*  
La hora me sorprendió  
the time me surprised  
'The time surprised me'

We can also show that nominal constructions involving overt *wh*-expressions, i.e. free relatives, behave like DPs and not like interrogatives in being allowed in the preverbal subject position. We can distinguish otherwise surface identical interrogatives and free relatives on the basis of the type of *wh*-pronoun they select. Spanish has two variants of *wh*-pronouns, one prosodically strong and one prosodically weak, a distinction reflected in the orthography as well (e.g. *quien* for the weak variant of “who” and *quién* for the strong one, *cuanto* and *cuánto* for “how many”, etc.). Crucially, depending on the construction, only one or the other variant is permitted: strong *wh*-pronouns occur in propositional environments, i.e. true questions and exclamatives, whereas the weak variant is used in nominal environments, i.e. free relatives. Below, (44a) states that what is surprising is the fact that a certain person came to the party. By contrast, (44b) claims that whoever came to the party, that person was surprising.

- (44) a. *Embedded interrogative*  
Es sorprendente [<sub>CP</sub> quién vino a la fiesta].  
is surprising who.STR came to the party  
'It is surprising who came to the party'

b. *Free relative*

Es sorprendente [<sub>DP</sub> quien vino a la fiesta].

is surprising who.WK came to the party

‘The person who came to the party is surprising’

Using *wh*-pronoun selection as a diagnostic, we can show that only free relatives—which require the weak variant—are allowed in the preverbal subject position.<sup>4</sup>

(45) **Strong Relative Pronoun *quién***

a. ✓ *Post-verbal*

Me sorprendió quiénes vinieron a la fiesta.

I.DAT surprised.3.SG WHO.PL came to the party

‘It surprised me who came to the party’

b. ✗ *Pre-verbal*

\*Quiénes vinieron a la fiesta me sorprendió.

WHO.PL came to the party I.DAT surprised.3.SG

(46) **Weak Relative Pronoun *quien***

a. ✓ *Post-verbal*

Me sorprendieron quienes vinieron a la fiesta.

I.DAT surprised.3.SG WHO.PL came to the party

‘Those who came to the party surprised me’

---

<sup>4</sup>Recall the agreement facts reported above in §4.1.3.2: subordinate questions/exclamations do not agree with matrix predicates, whereas relative clauses and free relatives do.

b. ✓ *Pre-verbal*

Quienes vinieron a la fiesta me sorprendieron.

WHO.PL came to the party I.DAT surprised.3.SG

‘Those who came to the party surprised me’

We can now turn to propositional ARs and ask whether they pattern like interrogatives or free relatives. As shown in (47), the AMOUNT reading is permitted only when the phrase in question occurs post-verbally; the pre-verbal variant is ungrammatical.

(47) **Amount Relatives**

a. ✓ *Post-verbal*

Me sorprendió los estudiantes que vinieron a la fiesta.

I.DAT surprised.3.SG the.MS.PL students that came to the party

‘It surprised me how many students came to the party’

b. ✗ *Pre-verbal*

\*Los estudiantes que vinieron a la fiesta me sorprendió.

D.MS.PL students that came to the party I.DAT surprised.3.SG

Again, we see that propositional ARs show pattern syntactically with interrogatives, and unlike ordinary DPs, even those DPs that have a question interpretations.

#### 4.1.3.4 Anaphora

DPs in Spanish require the same GENDER and NUMBER features on anaphors that refer back to them. However, it is also possible for anaphors to pick out non-nominal referents, like clauses, measure phrases etc. In these cases, neuter pronouns like *lo* and *ello* must be used. Here, we can use anaphora as a testing ground for the difference between propositional ARs and nominal restricted by relative clauses. If propositional ARs are ordinary DPs modified by relative clauses, anaphoric reference should only be available through the use of pronominal forms that agree in  $\varphi$ -features with the nominal head. Once again, we will use the dual nature



of *wh*-pronouns to set a baseline against which we compare the behavior of propositional ARs. Because strong *wh*-pronouns can only occur in clauses, anaphors referring back to those clauses will only take neuter forms, like the pronouns *lo* and *ello*. Free relatives with weak pronouns, on the other hand, will require anaphors that agree with the DPs containing the *wh*-pronoun in GENDER/NUMBER. Consider first the subordinate question in (48), with the strong *wh*-pronoun.

(48) **Strong *wh*-pronoun; subordinate question**

a. *With* NUMBER/GENDER *anaphor*

Me sorprendió [ cuántos artículos<sub>i</sub> escribió Raquel ]<sub>j</sub>, uno  
 I.dat surprised how many.STR.MS.PL papers wrote Raquel one  
 tiene que admirarse de ellos<sub>i/\*j</sub>.  
 must admire-REFL of PR.MS.PL

‘It surprised me how many papers Raquel wrote, one must admire her for them’

b. *With* NEUTER *anaphor*

Me sorprendió [ cuántos artículos<sub>i</sub> escribió Raquel ]<sub>j</sub>, uno  
 I.dat surprised how many.STR.MS.PL papers wrote Raquel one  
 tiene que admirarse de ello<sub>\*i/j</sub>.  
 must admire-REFL of PR.NT

‘It surprised me how many papers Raquel wrote, one must admire her for it’

In this minimal pair, (48a), with a plural anaphor, only has an interpretation where the reason for admiring Raquel is the particular articles that she wrote. On the other hand, (48b), with the neuter anaphor *ello*, conveys that the reason for admiration is the number of papers that Raquel wrote (and so *it* = *the amount of papers* in the translation).

(49) **Weak relative pronoun; free relative**

a. *With* NUMBER/GENDER *anaphor*

Me sorprendieron [ cuantos artículos<sub>i</sub> escribió Raquel ], uno  
I.dat surprised how many.WD.MS.PL papers wrote Raquel one  
tiene que admirarse de ellos<sub>i</sub>.  
must admire-REFL of PR.MS.PL

‘All the papers that Raquel wrote surprised me, one must admire her for them’

b. *With* NEUTER *anaphor*

\*Me sorprendieron [ cuantos artículos<sub>i</sub> escribió Raquel ], uno  
I.dat surprised how many.WD.MS.PL papers wrote Raquel one  
tiene que admirarse de ello<sub>i</sub>.  
must admire-REFL of PR.NT

‘The papers that Raquel wrote surprised me, one must admire her for it’

With the weak relative pronoun, we see a different pattern. In (49), only the plural anaphor *ellos*, as in (49a), is felicitous. The neuter anaphor *ello* in (49b) does not have a suitable antecedent and the sentence is therefore illicit. Thus, unlike embedded questions/interrogatives, which permit anaphoric reference by neuter anaphors, free relatives are DPs that require their anaphors to match with them in  $\varphi$ -features.

Propositional ARs, on the other hand, pattern with the *wh*-constructions that make use of strong *wh*-pronouns. As we see in (50a), the use of the plural anaphor *ellos* forces an OBJECT interpretation of the relevant construction. The use of neuter *ello*, on the other hand, is both grammatical and moreover yields an AMOUNT interpretation.

(50) **Amount Relatives**

a. *With* NUMBER/GENDER *anaphor*

Me sorprendió [ los artículos<sub>i</sub> que escribió Raquel ]<sub>j</sub>, uno tiene que  
I.dat surprised the.MS.PL papers that wrote Raquel one must  
admirarse de ellos<sub>i/\*j</sub>.  
admire-REFL of PR.NT

‘The papers that Raquel wrote surprised me, one must admire her for them’

b. *With* NEUTER *anaphor*

Me sorprendió [ los artículos<sub>i</sub> que escribió Raquel ]<sub>j</sub>, uno tiene que  
I.dat surprised the.MS.PL papers that wrote Raquel one must  
admirarse de ello<sub>\*i/j</sub>.  
admire-REFL of PR.NT

‘It surprised me how many papers Raquel wrote, one must admire her for it’

Finally, notice that in the agreeing variant of (50b), ungrammaticality ensues only with the neuter anaphor *ello*, but not with the agreeing *ellos*.

(51) a. \*Me sorprendieron [ los artículos<sub>i</sub> que escribió Raquel ]<sub>j</sub>, uno tiene que

I.dat surprised the.MS.PL papers that wrote Raquel one must  
admirarse de ello<sub>i/j</sub>.  
admire-REFL of PR.NT

‘It surprised me how many many papers Raquel wrote, one must admire her for it’

b. Me sorprendieron [ los artículos<sub>i</sub> que escribió Raquel ]<sub>j</sub>, uno tiene que

I.dat surprised the.MS.PL papers that wrote Raquel one must  
admirarse de ellos<sub>i/j</sub>.  
admire-REFL of PR.NT

‘The papers that Raquel wrote surprised me, one must admire her for them’

#### 4.1.3.5 Differential Object Marking

Spanish is a language where direct objects that are both specific and human must be preceded by the preposition *a* (“to”). This is an instance of Differential Object Marking (DOM; see Torrego 1998, Leonetti 2004 a.o.).

- (52) a. María besó \*(a) Raquel  
María kissed to Raquel
- b. María besó (\*a) el retrato  
María kissed to the portrait

In certain cases, specific and non-human animate objects may trigger DOM as well, depending on the closeness or “relative humanity” attributed to them.

- (53) María vió (a) la gata  
María saw to the cat

Unlike this subset of nominals, clausal arguments do not show DOM. We can again construct minimal pairs using the by now familiar strong/weak distinction of *wh*-pronouns. The strong pronoun forms subordinate interrogatives, which, being clausal, do not trigger DOM; weak pronouns, on the other hand, form free relatives, which, if animate and specific, must trigger DOM.

- (54) a. *Strong wh-pronoun*
- María vió (\*a) quién vino a la fiesta  
María saw to who came to the party  
‘María saw who came to the party’

b. *Weak wh-pronoun*

María vió \*(a) quien vino a la fiesta

María saw to who came to the party

‘María saw the person who came to the party’

We turn now to propositional ARs. If the animacy/specificity of the superficial head noun in propositional ARs were sufficient to trigger DOM, this would suggest that despite the variability in interpretation, propositional ARs are syntactically garden-variety DPs. However, this is not what happens; propositional ARs do not trigger DOM, as shown in (55). Not only is the variant without DOM in (55a) grammatical and has the AMOUNT reading, the sentence in (55b) with DOM cannot receive such an interpretation.

(55) a. Estudian los delegados que enviarán

evaluate.3.PL the.MS.PL representative.MS.PL that send

‘They are evaluating {what/how many} representatives they will send.3.PL’

b. Estudian a los delegados que enviarán

evaluate.3.PL to the.MS.PL representative.MS.PL that send

‘They are evaluating the (individual) representatives they will send.3.PL’

#### 4.1.4 Interim summary & challenges

To sum up, Spanish propositional ARs look like ordinary DPs, yet seem to have the external distribution and bear the syntactic blueprints of *wh*-constructions. They can complement verbs that otherwise do not take nominal complements, show syntactic constraints that do not apply to ordinary DPs, and show mysterious agreement and case assignment patterns. Yet, they look on the surface like ordinary nominals and seem to be headed by a definite determiner, suggesting that they are categorically a DP. Thus, among our key desiderata in the remainder of this chapter is to account for the mixed nature of propositional ARs. In the following two sections, I propose a structure for propositional ARs that takes seriously

their syntactic and semantic parallels with interrogatives and exclamation marks. In a nutshell, I suggest that propositional ARs start their lives out, both syntactically and semantically, as a *wh*-construction. Their nominal nature is derived by merging a special variant of the definite article, which I call  $D_{ANS}$ , which combines with a question and returns a proposition. Not only will this account explain the puzzling syntactic behavior of propositional ARs, it also offers insight into why other languages do not have analogous constructions.

## 4.2 Proposal: the syntax of propositional ARs

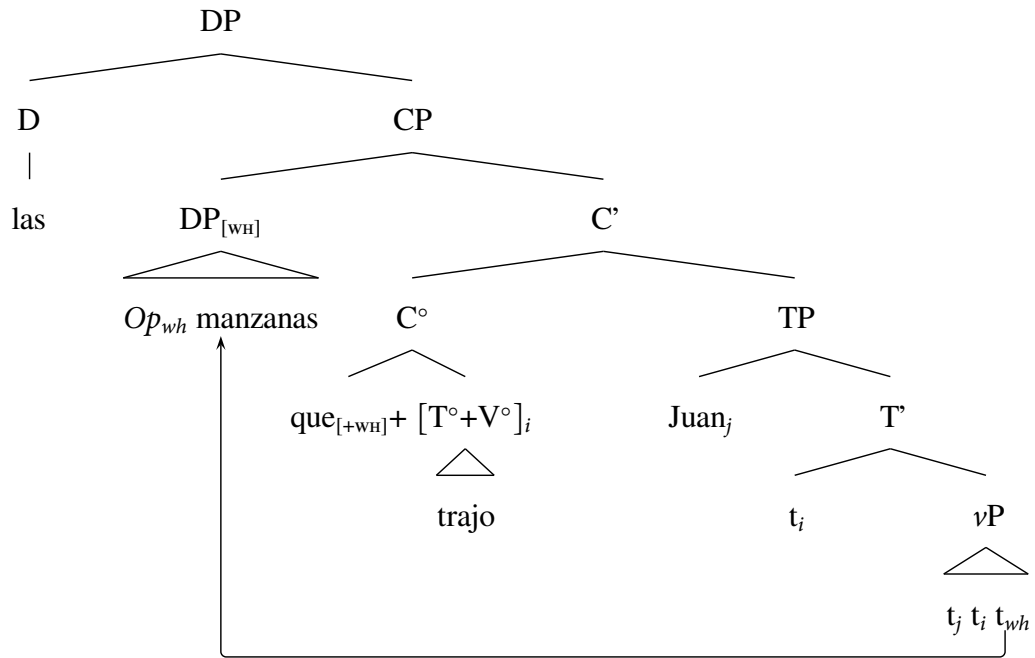
This section presents an analysis of propositional ARs as interrogative structures. Propositional ARs are not born as DPs, but as full clauses. The syntactic make-up of propositional ARs is akin to interrogative clauses, which involve a [+WH] specified  $C^\circ$  head with an interrogative core. The resulting construction is a DP with an embedded CP providing question semantics that is only superficially identical to an NP modified by a relative clause.

Consider the example in (56) as a working case.

- (56) ... las manzanas que trajo Pedro.  
the.FM.PL apples that brought Pedro

The example in (56) looks like a restrictive relative clause, but, as I hope has been shown throughout this chapter, there are reasons to believe that it cannot just be an ordinary relative clause. The structure that I propose for DPs like (56) *qua* propositional ARs is represented below.

(57) Syntactic structure of propositional ARs

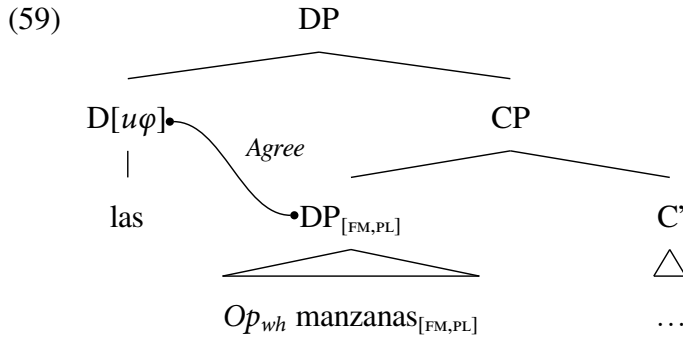


The structure in (57) is reminiscent of that proposed by Borsley (1997) and Bianchi (1999) for restrictive relative clauses. For these authors, D directly takes a CP as its complement (see also Kayne 1994), and the constituent targeted for movement is not an NP, but a DP headed by a null determiner.

(58) [<sub>DP</sub> the [<sub>CP</sub> [<sub>DP</sub> *e* books]<sub>*i*</sub> [<sub>C</sub> that [<sub>TP</sub> you read t<sub>*i*</sub>]]]

There are two main differences between their structures and mine: (i) the presence of a C° head with a [+WH] feature in (57) and (ii) that the null determiner in (57) is a *wh*-operator. With these ingredients, the derivation proceeds as follows. The [+WH] C° head probes for an element in its domain with matching [WH] specifications, either a question or an exclamative, and agrees with that element. Spanish is a *wh*-movement language, and this Agree relation triggers movement of the *wh*-goal to the specifier of CP. Moreover, finite verbs in Spanish overtly move to T (Rizzi 1982) and when there is *wh*-movement, there is also accompanying T-to-C movement, such that the verb is pronounced to the immediate right of the moved *wh*-expression (Torrego 1984, Suñer 1994 and Gallego 2007 a.o.).

Finally, the D introducing the definite article enters in the derivation with an unvalued  $\varphi$ -feature,  $D[u\varphi]$ . In the current structure, unlike with restrictive relative clauses, the sister of D lacks these features, but the DP in [Spec,CP], which is equidistant to CP and also in the c-command of  $D[u\varphi]$  can serve as a suitable goal.



Summing up, the proposed structure for propositional ARs in Spanish. The key aspects of (57) amount to (i) a [+WH] feature on  $C^\circ$ , (ii) the presence of a null *wh*-operator generated in VP internal position, and (iii) the ability of the definite article to combine with a non-relative CP. These three aspects of the syntax of propositional ARs demand some more elaboration, so I will discuss them in turn.

#### 4.2.1 The nature of the [WH] feature

The structure in (57) takes propositional ARs to involve a type of interrogative  $C^\circ$ , yet propositional ARs and ordinary interrogatives differ in a number of important ways. For one, propositional ARs can never form matrix interrogatives.

##### (60) Matrix interrogative

\*Las manzanas que trajo Pedro?

the.FM.PL apples that brought Pedro

'What apples brought Pedro?



Moreover, genuine embedded interrogatives are incompatible with the complementizer *que*, which is obligatory in propositional ARs.

(61) a. *Embedded interrogative*

Me pregunto cuántas manzanas (\*que) trajo Pedro.  
I.DAT wonder how many apples that brought Pedro  
'I wonder how many apples Pedro brought'

b. *Propositional AR*

Me pregunto las manzanas \*(que) trajo Pedro.  
I.DAT wonder the apples that brought Pedro

Given these differences, we are forced to ask: what is the nature of the [+WH] C° head in propositional ARs? I would like to suggest that the C° in propositional ARs is the same one as in *wh*-exclamatives. The parallels between the two constructions are various (see §4.1.3). For instance, propositional ARs, which, as we saw before, do not form good matrix interrogatives, do nevertheless form grammatical and felicitous matrix exclamatives. Moreover, exclamatives are compatible with the complementizer *que*.

(62) a. *Matrix exclamative*

Las manzanas que trajo Pedro!  
what apples that aux brought  
'The apples that Pedro brought!'

b. *Exclamatives with que*

Cuántas manzanas que trajo Pedro!  
how many apples that aux brought  
'How many apples Pedro brought!'

These two examples show properties of Spanish exclamatives that, although relevant for propositional ARs, fall out of the scope of this work and I will not address them here. For

instance, sub-sentential exclamatives like (62a) rely on some form of null *wh*-operators to be interpreted whose nature varies depending on particular views of exclamatives like (62a). These have been argued to be either sentential (e.g. Zanuttini and Portner 2003, Portner and Zanuttini 2005, Gutiérrez-Rexach 2014) or sub-sentential (e.g. Rett 2015 and the papers in Bosque 2017). Here I will not discuss the exact nature of the operators involved in the interpretation of (62a).

Lastly, it may seem that the structure proposed in (57) is in violation of the doubly filled COMP filter (Chomsky and Lasnik 1977).<sup>5</sup> I do not dwell on this issue for two main reasons. First, if we admit that this is an issue, there are simple technical solutions, such as adopting multiple CP layers (see e.g. Watanabe 1993, Benincà 1996, Gutiérrez-Rexach 2001, Goria 2002, Ambar 2003, You 2013 a.o.). Second, there are other structures in Spanish that also seem to be in violation of this filter, including certain types of relative clauses, thereby calling into question the role of the filter in the language (Plann 1982, Suñer 1984, Arregi 1998, Lahiri 2002, a.o.).

#### 4.2.2 The null *wh*-operator

I will assume that the null operator  $Op_{wh}$  may come in two forms, as covert variants of the overt *wh*-words *qué* (“what” or “how”) and *cuánto* (“how many”). That is, the only differences between  $Op_{wh}$  and *qué* and *cuánto* are simply overtness vs. covertness; otherwise,  $Op_{wh}$  is identical to the *wh*-words we see overtly on exclamatives. The evidence for such covert operators comes, once again, from exclamative constructions. Consider the ordinary matrix exclamations below.

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<sup>5</sup>The Doubly Filled COMP Filter in (i) was proposed to rule out sentences like (ii).

(i) **Doubly Filled COMP Filter**

\*<sub>[COMP *wh*-phrase  $\varphi$ ],  $\varphi \neq e$</sub>

[where *e* means “deleted”]

(ii) \*the man [<sub>CP</sub> who [<sub>C</sub> that met you]] is my friend

- (63) a. Qué listo que es Pedro!  
 what intelligent that is Pedro!  
 ‘How intelligent Pedro is!’
- b. Cuántas ganas le pone el tío!  
 how many effort.FM.PL him put the dude  
 ‘How much effort the dude is putting in!’

As Hernanz (2006) and Hernanz and Rigau (2006) show, the *wh*-word can be dropped from the *wh*-phrases in (63), resulting in the semantically equivalent variants of (64).

- (64) a. Listo que es Pedro!  
 intelligent that is Pedro!  
 ‘How intelligent Pedro is!’
- b. Ganas le pone el tío!  
 effort.FM.PL him put the dude  
 ‘How much effort the dude is putting in!’

#### 4.2.3 The role of the determiner

The proposed structure in (57)–repeated here–requires the definite article to select a CP.

- (57) [<sub>DP</sub> las [<sub>CP</sub> [<sub>DP[WH]</sub> *Op<sub>wh</sub>* manzanas]<sub>i</sub> [<sub>C</sub> que<sub>[+WH]</sub> [trajo]<sub>j</sub> [<sub>TP</sub> Juan t<sub>j</sub> t<sub>i</sub>]]]]  
 the apples that brought Juan

This is common practice under some variants of the raising analysis of relative clauses, originated in Kayne (1994) (cf. Borsley 1997 and Bianchi 1999). But there is a big difference in terms of the featural specification of C° in relative clauses on the one hand and propositional ARs on the other: the former is a C°[+REL] whereas the later is C°[+WH]. This difference is crucial, as we saw above, to derive the SV inversion patterns reported in §4.1.3.1. But the

distinction is also meaningful for the semantic composition of propositional ARs (as will be clear in the next section).

The issue is the following: if we take for granted the results presented here so far, i.e. if we are assuming that propositional ARs are syntactically questions up to CP, what is the role of the definite article? From a syntactic stand-point, notice that the behavior of the definite article is quite flexible in Spanish in general. For instance, unlike in Germanic languages, it can appear with tensed clauses.

- (65) a. No me gusta el [CP que tu actúes así ].  
           not me like the that you behave.SUBJ so  
           ‘I don’t like your behaving like that’
- b. El [CP que Juan llegue tarde ] no me importa  
           the that Juan arrive.SUBJ late not me care  
           ‘I don’t care if Juan arrives late’

For the cases that occupy us, however, I want to defend the idea that the definite article we see in propositional ARs is not the run-of-the-mill definite article. Instead, it is a variant similar to the Answerhood operator proposed in Heim (1994) and Dayal (1996). Let us refer to this variant of D as  $D_{ANS}$ . I will postpone the discussion of its semantic details until the next section, and concentrate now on its syntactic properties.

Syntactically, I take  $D_{ANS}$  to be an impoverished variant of its ordinary cousin  $D_{NOM}$  (henceforth I will use  $D_{NOM}$  to refer to the ordinary definite article). In section §4.1.3 we saw that propositional ARs do not behave syntactically as other DPs do, including DPs with restrictive relative clauses. A subset of that evidence, summarized below for convenience, shows that propositional ARs establish grammatical relations, e.g. Agree, differently (see short description under each phenomenon, full discussion can be found in §4.1.3).

- (31) **SV agreement** [*Subject DPs must agree in NUMBER with the matrix predicate; propositional ARs trigger neuter agreement.*]

- a. Me sorprendió los amigos que invitó Pedro.  
 I.DAT surprised.3.SG the.MS.PL friend.MS.PL that invited Pedro  
 ‘It surprised me {what/how many} friends that Pedro invited’
- b. Me sorprendieron los amigos que invitó Pedro.  
 I.DAT surprised.3.PL the.MS.PL friend.MS.PL that invited Pedro  
 ‘The friends that invited Pedro surprised me’

These data suggest that the  $\varphi$ -features that are visible on the D heading the propositional AR (e.g., MS.PL in (31)) are nevertheless not visible to the agreeing V. Thus, the Agree mechanism proposed in (59) above, where  $D_{ANS}$  gets its  $\varphi$ -features valued by the *wh*-DP in [Spec,CP], can only be part of the explanation. As I show below, the solution to this mismatch lies in the particularities of  $D_{ANS}$  and its own  $\varphi$ -featural composition.

It is well-known that Agreement, as a grammatical operation, is sometimes sensitive to syntactic features and some other times to semantic features. But, as Corbett (2006) has shown, occasionally it appears that Agreement is sensitive to both types of features *simultaneously*, within the same utterance. The consequence is that controllers of agreement must carry two sets of  $\varphi$ -features. Recent examples of papers exploring and corroborating these implications can be found in Danon (2013) and Landau (2016).

According to Corbett (2006, 155–157), “semantic agreement” is consistent with the meaning of the controller, whereas “syntactic agreement” is consistent with its form. This divergent distribution of  $\varphi$ -features within the DP is very well attested across languages. The cases that interest us are those where a mismatch occurs between the DP internal  $\varphi$ -features and the  $\varphi$ -features that it controls outside the DP. The following are some such examples in English (from Danon 2013, Landau 2016 and Rullman 2010).

(66) **Syntactic agreement**

- a. [<sub>DP[SG]</sub> Part of the residents ] has.SG opposed the plan.
- b. [<sub>DP[SG]</sub> The committee ] has.SG decided on the issue.
- c. [<sub>DP[SG]</sub> Each of us ] thinks.SG that we can win the nomination.

(67) **Semantic agreement**

- a. [<sub>DP[SG]</sub> Part of the residents ] have.PL opposed the plan.
- b. [<sub>DP[SG]</sub> The committee ] have.PL decided on the issue.
- c. [<sub>DP[SG]</sub> Each of us ] think.PL that we can win the nomination.

The agreement patterns in (67) are the flip-side of Spanish propositional ARs. In (67), a morphologically singular DP controls plural agreement on the verb, whereas in Spanish propositional ARs a morphologically plural DP controls singular agreement on the verb. Of course, this state of affairs raises questions about Agree. In the particular cases at hand, (67) and propositional ARs in Spanish, are there multiple Agree operations, each targeting a different set of  $\varphi$ -features borne by potentially different heads? Moreover, in addition to making the relevant Agree relationship available, we need to understand as well where the difference between  $D_{ANS}$  and  $D_{NOM}$  exactly lies.

The solution that I propose is couched in terms of Wechsler and Zlatić's (2003) original distinction between CONCORD and INDEX features, (partially) following Landau's (2016) configurational adaption. The gist of the idea is that morphologically-rooted features (CONCORD features) are hosted on the noun stem while semantically-rooted features (INDEX features) are hosted on higher functional heads. Following Danon (2013), I will assume that the only  $\varphi$ -features that are accessible to agreement from outside of the DP are those in the highest nominal projection, D in the case of DPs (this is accordance with phase-based conceptions of agreement, but largely independent of it). As a consequence, D must somehow mediate

between the DP-internal and DP-external  $\varphi$ -agreement. Graphically, this can be represented as follows (cf. Landau 2016):

$$(68) \quad \underbrace{[_{TP} T^{\circ} [_{VP} V^{\circ} ]]}_{\text{External Agree Zone}} \underbrace{[_{DP} D [_{XP} \dots ]]}_{\text{Internal Agree Zone}}$$

The low boundary of the External Zone is determined by D, which in turns determines the high boundary of the Internal Zone. Here DP-external agreement takes place after D has carried out all the Agree operations DP-internally. In Landau’s (2016) terms, D is the “contact point” between external probes like  $v$  and T, and any nominal  $\varphi$ -features there may be inside the DP.

Both Wechsler and Zlatić (2003) and Landau (2016) show convincingly that Agree in the External Zone almost exclusively targets INDEX features.<sup>6</sup> This means that inherently INDEX (semantic or, in this case, “interpretable”) features, such as [PERSON], will always be specified as valued features on D, since N is not specified for [PERSON]. In turn, D must have unvalued CONCORD (morphological) features that it will inherit from N. Thus, by the time that V is merged and is probing for agreement, D has already probed into its Internal Agree Zone and valued all the unvalued features it had.

We are now ready to look into the featural specifications of  $D_{\text{NOM}}$  and  $D_{\text{ANS}}$  in Spanish. I will begin with the more familiar  $D_{\text{NOM}}$ .<sup>7</sup>

$$(69) \quad \text{Feature array of } D_{\text{NOM}} \left[ \begin{array}{l} \text{INDEX} \left[ \begin{array}{l} \mu\text{GENDER: } \_ \\ \mu\text{NUMBER: } \_ \end{array} \right] \\ \\ \text{CONCORD} \left[ \begin{array}{l} \mu\text{GENDER: } \_ \\ \mu\text{NUMBER: } \_ \end{array} \right] \end{array} \right]$$

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<sup>6</sup>Landau (2016) comments on two possible answers for why this must be the case, giving a locality-based answer and a type-based answer. I refer the interested reader to the original paper.

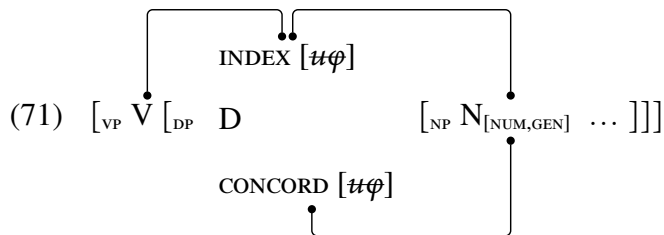
<sup>7</sup>Only the nominal NUMBER and GENDER features are represented. (Un)valuation is marked with the privative feature  $\mu$ , so that unvalued features are represented as [ $\mu$ F] and valued ones simply as [F].

According to (69), all its features, INDEX and CONCORD are unvalued. This means that D will have to value them all in the Internal Agree Zone from some goal, N in this case, which only contains valued CONCORD features.

(70) **Feature array of N**

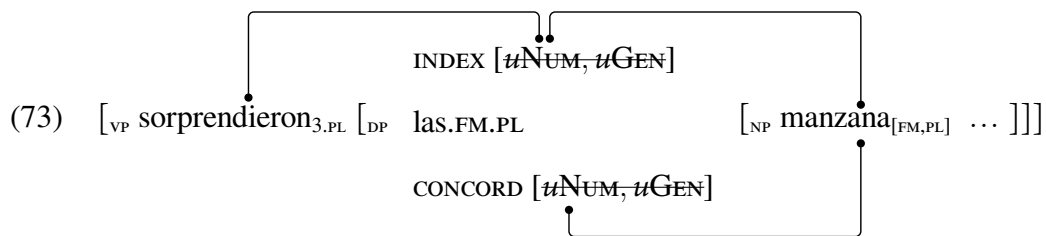
$$\left[ \begin{array}{c} \text{CONCORD} \\ \left[ \begin{array}{c} \text{GENDER} \\ \text{NUMBER} \end{array} \right] \end{array} \right]$$

This is the most common situation, one where INDEX and CONCORD features on D have the same specifications. Schematically:



The [ $u\varphi$ ] features of D, both INDEX and CONCORD, are valued by the [ $\varphi$ ] features on N. With its valued INDEX [ $\varphi$ ] features, D can serve as goal for a probing V. Thus, for (72) we have (73).

(72) Me sorprendieron las manzanas que trajo Pedro.  
 me surprised.3.PL the.FM.PL apple.FM.PL that brought Pedro



Let us look at  $D_{\text{ANS}}$  now. I mentioned earlier the intuition that  $D_{\text{ANS}}$  seemed to be “defective”, in the sense that it rendered opaque the  $\varphi$ -features of the nominal in [Spec,CP] for DP-external



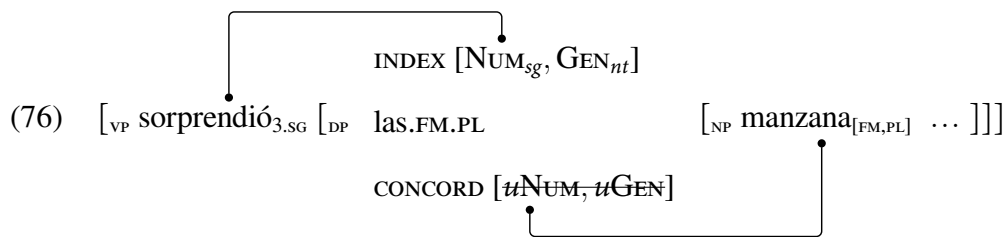
probes. We can now formulate this intuition in a concrete way:  $D_{ANS}$  enters in the computation with valued  $\varphi$  INDEX features and unvalued CONCORD  $\varphi$ -features. In this respect, it differs from  $D_{NOM}$  precisely in that, although it can Agree with the nominal in [Spec,CP], it is not able to “pass on” its features further up in the tree. Its feature specification looks as in (74).

(74) **Feature array of  $D_{ANS}$**

$$\left[ \begin{array}{l} \text{INDEX} \\ \text{CONCORD} \end{array} \left[ \begin{array}{l} \text{GENDER: } nt \\ \text{NUMBER: } sg \\ \text{uGENDER: } \text{---} \\ \text{uNUMBER: } \text{---} \end{array} \right] \right]$$

Given its feature configuration, whenever  $D_{ANS}$  is involved, only NEUTER and SINGULAR  $\varphi$ -features will be visible from any DP-external position. In a case with SV agreement mismatch like (75) the agreement relationships are established as in (76).

(75) Me sorprendió las manzanas que trajo Pedro.  
 me surprised.3.SG the.FM.PL apple.FM.PL that brought Pedro



This configuration correctly captures the behavior of propositional ARs with respect to the three phenomena mentioned earlier: SV agreement, anaphora and DOM.<sup>8</sup> In the ideal case, one will be able to tie in the valued INDEX features of  $D_{ANS}$  with the presence of a of a [+WH]

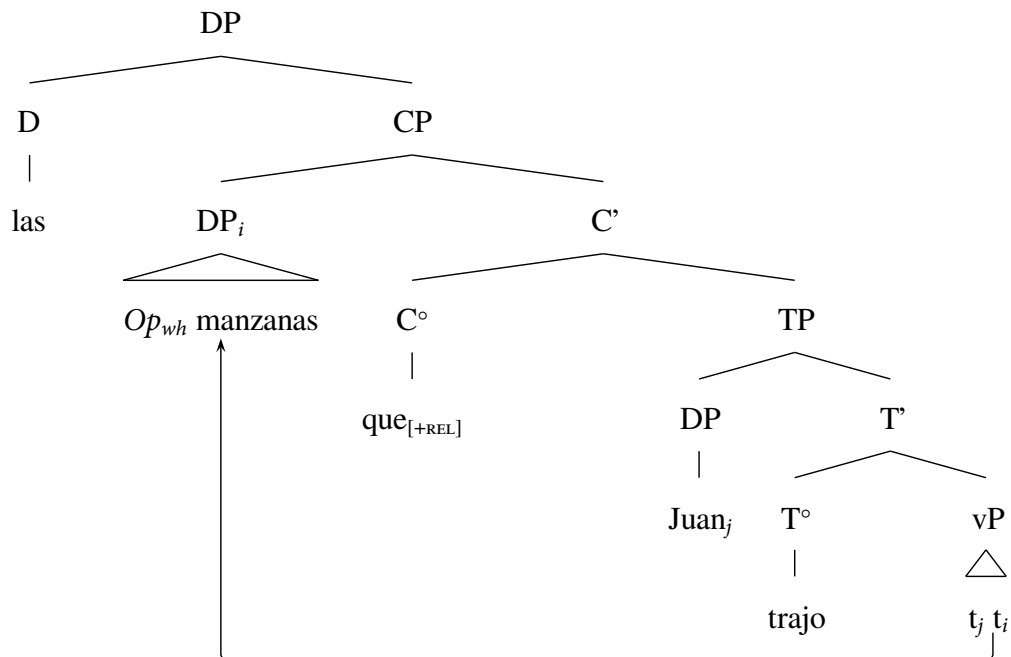
<sup>8</sup>I did not include case features in the exposition, but the system works all the same for case as well.

C° in its complement position. This would provide the first step towards an explanation for why D<sub>ANS</sub> but not D<sub>NOM</sub> must come with valued INDEX features. I will leave this question open for future study.<sup>9</sup>

#### 4.2.4 Relation to nominal ARs

The structure proposed in (57) above for propositional ARs differs from that of nominal ARs discussed in §3 only in the specification of the C°-head. In nominal ARs, the structure for which is repeated in (77), we have an interrogative C°[+WH] head, whereas nominal ARs have relative C°[+REL]; as will be demonstrated shortly, only the former will give rise to a question meaning.

(77) **Syntactic structure of nominal ARs in Spanish** [with optional T-to-C movement]



<sup>9</sup>One may also wonder whether it is a coincidence that the INDEX features on D<sub>ANS</sub> are neuter and singular, raising the question of whether this is some form of “default” in Spanish. But notice that, since we still need the relevant  $\phi$ -features to agree inside the DP, it is not clear how D<sub>ANS</sub> could show default agreement in this sense.

Thus, variation in just a few key pieces is able to capture the similarities and differences between propositional ARs and nominal ARs. The string-identity of propositional and nominal ARs follows from the fact that much of their structural make-up is indeed the same. However, because of differences in the nature of the C°-head involved, the resulting phrases differ in meaning.

At this point it is useful to stop and look at the resulting landscape of *wh*-constructions in Spanish. We can provide a comprehensive description of all the syntactic structures discussed so far by looking at three moving pieces: (i) the pair of operators *qué* and *cuánto*, which (ii) vary with respect to their overtness (i.e. overt in subordinate interrogatives and exclamatives vs. covert in ARs) and (iii) with respect to the make up of the CP they come in, i.e. whether they involve a [+WH] or [+REL] C° head. The full paradigm is spelled out below.

	C°	Op <sub>wh</sub>	complementizer	definite article	nominal head
<i>cuánto</i> INT/EXCL	[+WH]	overt	no	no	yes
<i>qué</i> INT/EXCL	[+WH]	overt	no	no	yes
<i>cuanto</i> FR	[+REL]	overt	no	no	yes
<i>lo que</i> FR	[+REL]	covert	yes	yes	no
propositional AR	[+WH]	covert	yes	yes	yes
nominal AR	[+REL]	covert	yes	yes	yes

**Table 4.1.** Relation of features in ARs vs. overt *wh*-operator constructions.

As the table shows, the (c)overtness of the *wh*-operator, the presence of the complementizer *que* and the definite article go hand in hand. As a consequence, going from a propositional AR to a nominal AR involves just one change. Similarly, going from ordinary free relatives to a structure like (77) simply amounts to inverting the overtness/covertness of the different pieces involved in constructing a free relative, as described above. This gives us a typology of at least three possible structures for a sequence of the form *the NP that* in Spanish—ignoring the possibility of a matching relative structure.

(78) a. *Relative clause:*

$[_{DP} \text{ las } [_{NP} \text{ manzanas}_j \text{ } [_{DP} \text{ Op } t_j ]_i \text{ } [_{C^0} [+REL] \text{ que } [_{TP} \text{ María compró } t_i ]]]]$

b. *Nominal AR:*

$[_{DP} \text{ las } [_{CP} \text{ } [_{DP} \text{ Op manzanas}]_i \text{ } [_{C^0} [+REL] \text{ que } [_{TP} \text{ María compró } t_i ]]]]$

c. *Propositional AR:*

$[_{DP} \text{ las } [_{CP} \text{ } [_{DP} \text{ Op manzanas}]_i \text{ } [_{C^0} [+WH] \text{ que+} [\text{compró}]_j \text{ } [_{TP} \text{ María } t_j \text{ } t_i ]]]]$

### 4.3 Semantic analysis

As I hope has emerged throughout the chapter, there is a lot to gain by attributing to propositional ARs the syntactic structure of *wh*-constructions like questions and exclamatives. In this section, I show how we can also capture their semantic properties by interpreting them as questions and exclamations.

The empirical landscape that we need to capture varies along two main axes: (i) the type of predicate to which propositional ARs are complements (rogative, responsive and emotive factives), and (ii) the two types of interpretations that propositional ARs may have (OBJECT and AMOUNT interpretations).

#### 4.3.1 Background: the basics of questions

In this section I lay out my assumptions about the semantics of questions. The baseline theory of questions that I am assuming is a blend between the well-studied proposals by Hamblin (1973) and Karttunen (1977), with the incorporation of Dayal's (1994, 1996) idea that the truth requirement on question denotations is introduced by an answerhood operator.

##### 4.3.1.1 Question as sets of answers

In Hamblin's (1973) original proposal, questions denote sets of propositions. In particular they denote the set of their possible answers. Thus, a question like (79a) below is interpreted

as the set in (79b), often referred to as a Hamblin-set. The set in (79c) exemplifies one such possible meaning.

(79) a. Which book did Liz read?

b.  $\llbracket (79a) \rrbracket = \lambda p. \exists x [book(w)(x) \wedge p = \lambda w'. read(x, Liz)]$

c. {that Liz read The Hobbit, that Liz read Don Quixote, that Liz read Crime & Punishment...}

In questions, *wh*-phrases may range over singular as well as plural individuals. In order to extend this account to plural questions, I adopt the ontology of plural individuals from Sharvy (1980) and Link (1983): singular terms denote in the atomic domain whereas plural terms may denote plural and singular individuals. Plural morphology (as well as the conjunction *and* in one of its senses) signals the presence of a pluralization operation ‘\*’ denoting the summing operation  $\oplus$ . This operator generates all the individual sums of members of the extension of any 1-place predicate *P*.<sup>10</sup> Thus, the denotation of  $*P$  is closed under the sum operation. The consequence for the semantics of questions is that we now have different Hamblin-sets for plural and singular individuals.

(80) a. Which books did Liz read?

b.  $\llbracket (80a) \rrbracket = \lambda p. \exists x [*book(w)(x) \wedge p = \lambda w'. read(x, Liz)]$

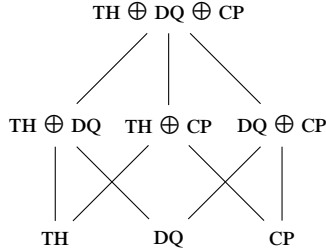
(81)  $\left\{ \begin{array}{ll} \text{that Liz read } TH \oplus DQ \oplus CP, & \text{PL} \\ \text{that Liz read } TH \oplus DQ, \text{ that Liz read } TH \oplus CP, \text{ that Liz read } DQ \oplus CP, & \text{PL} \\ \text{that Liz read } TH, \text{ that Liz read } DQ, \text{ that Liz read } CP & \text{SG} \end{array} \right\}$

---

<sup>10</sup>The \*-operator denotes a function from  $D_{(et)}$  into  $D_{(et)}$  such that, for any  $f \in D_{(et)}$  and any  $x \in D_e$ ,  $*f(x) \leftrightarrow [f(x) \vee \exists y \exists z [*f(y) \wedge *f(z) \wedge x = y \oplus z]]$ .

The resulting set of answers is order by entailment: if *Liz read The Hobbit and Don Quixote*, it must be the case that *Liz read The Hobbit*.<sup>11</sup>

(82) Ordering of the Hamblin-set in (128):



The entailment relations may cause problems in embedded contexts. Karttunen (1977) observed that (83a) entails that for every book that Liz read, Bill knows that she read it. But this does not follow from the embedded question if we assume that it denotes a Hamblin-set like (81), since there is no reference to the propositions in (81) that are true in the actual world. Thus, Karttunen argued that the denotation of questions must be limited to the set of their true answers, as in (84); this is what is usually referred to as the *truth requirement* on question denotations.

(83) a. Bill knows which books Liz read

b.  $\llbracket (83a) \rrbracket = \llbracket know(\llbracket (81) \rrbracket)(Bill) \rrbracket$

(84)  $\llbracket (83a) \rrbracket = \lambda p. \exists x [p(w) \wedge *book(x) \wedge p = \lambda w'. read(w')(x, Liz)]$

This reading is referred to as the *weakly exhaustive* interpretation of questions. At this point, it is useful to define the maximal element, i.e. the unique element that is true and entails the rest

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<sup>11</sup>A quick clarification. In Link's (1983) system plural entities are just *sums* of individuals, as concrete as the individuals that serve to define them and of the same logical type. Therefore, the question alternatives in (81) denote distinct propositions, and are **not** ordered by entailment. This works when the predicate is collective (if *Sue and Liz are a good couple* it does not follow that *Sue is a good couple*). For distributive interpretations, we must order the propositions in the Hamblin-set by entailment. Following Link (1983), we can apply a distributive operator <sup>D</sup> to the predicate. The distributive operator states that, if some property *P* is true of a (possibly) plural individual *x*, then it must be true of any individual part of *x* as well. That is,  ${}^D P(x) \leftrightarrow P(x) \wedge \forall y [y \leq_i x \rightarrow P(y)]$ . Now the denotation of  ${}^D(*P)$  forms a complete join-subsemilattice in the domain *D* of individuals that *P* generates by operating over atoms, and the different members are ordered by entailment.

of the true answers. The reason is that questions about singular and plural individuals differ on the felicity of the possible answers. For instance, (85a) can felicitously answer both (79a) and (80a). However, (85b) can only felicitously answer (80a), but not (79a). (Both answers are possible for a question like (86).)

- (85) a. Liz read The Hobbit.  
       b. Liz read The Hobbit and Don Quixote.

(86) What did Liz read?

This shows that the choice between a singular or a plural *wh*-phrase is reflective of speakers' expectations regarding the number of entities that should be mentioned in the answer. The problem is reminiscent of expectations raised by singular *vs.* plural definite descriptions. Given (i) the structural parallelism between partially ordered sets of answers like (82) and the domain of individuals in the Sharvy/Link tradition, and (ii) the similar felicity conditions shared by definite descriptions and answers to questions, it is no surprise that a solution would come from introducing maximality/uniqueness in the question denotations. Here I follow Dayal (1996), who defines an operator  $\text{ANS-D}_w$  that essentially mimics the functions of a definite determiner: it applies to a set of propositions (a Hamblin-set) and picks the maximum of the true answers (see also Heim 1994 and Rullmann 1995).<sup>12</sup>

$$(87) \quad \llbracket \text{ANS-D}_w \rrbracket = \lambda Q_{\langle st, t \rangle} . \lambda w . t p [p(w) \wedge Q(p) \wedge \forall q [(q(w) \wedge Q(q) \rightarrow p \subseteq q)]]$$

Coming back now to the weakly exhaustive interpretation of (83a) as expressed in (84), it is well known that this interpretation is sometimes too weak (but see discussions in Heim 1994 and Beck and Rullmann 1999). It was Groenendijk and Stokhof (1984) who brought attention to this issue in the context of questions embedded under cognitive factives. The

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<sup>12</sup>Notice that this operator applies to the full Hamblin-set and not just to the set of true answers. The truth requirement on questions is introduced by the operator itself. See Dayal (1994, 1996, 2017) for arguments in favor of this change.

intuition is that, if Bill knows which books Liz read, he must know, for every book in the domain, whether she read it or not. This is usually referred to as the *strongly exhaustive* interpretation of questions. This is not what (84) means, however; (84) claims that for every book that Liz actually read, Bill knows that Liz read that book. That is, (84) is compatible with Bill believing of a book that Liz did not read that she actually read it. This seems too weak.<sup>13</sup> For this reason, Groenendijk and Stokhof (1982, 1984) argue for a strengthened version of (84), where the alternatives that are not entailed are false. The authors propose a system where this meaning is derived by assuming that questions denote equivalence relations over sets of possible worlds:

(88) a. Bill knows who came

$$b. \llbracket (88a) \rrbracket = \lambda w'. \lambda w'' [\lambda x. came(w')(x) = \lambda x. came(w'')(x)]$$

As Heim's (1994) noted, however, the same results can be obtained by means of a second answerhood operator. Then, the strengthening can be enforced either by establishing a partition of possible worlds out of the set of true answers, or by explicitly denying non-entailed alternative answers:

(89) a. *Partition based strongly exhaustive answers*

$$\llbracket \text{ANSSTR}_p \rrbracket = \lambda Q_{(st,t)}. \lambda w. \lambda w' [\text{ANS-D}_w(Q)(w) = \text{ANS-D}_w(Q)(w')]$$

b. *Negation based strongly exhaustive answers*

$$\llbracket \text{ANSSTR}_n \rrbracket = \lambda Q_{(st,t)}. \lambda w. \iota p [p(w) \wedge \forall q [[Q(q) \wedge p \not\subseteq q] \rightarrow \neg q(w)]]$$

---

<sup>13</sup>It is widely accepted that the strongly exhaustive reading of (83a) is possible and easily accessible. There is debate, however, as to whether (83a) also has, in addition, a weakly exhaustive interpretation. One position, held by Groenendijk and Stokhof (1984), George (2011) and Uegaki (2015), holds that that weakly exhaustive readings are not accessible for cognitive factives (although they are for other veridical responsive predicates); in turn, Karttunen (1977); Heim (1994); Guerzoni and Sharvit (2007) and Klinedinst and Rothschild (2011) believe that weakly exhaustive interpretations are also available under cognitive factives. Part of the evidence that the latter present are sentences like (i) (from Guerzoni and Sharvit 2007), which would be rendered inconsistent under a strongly exhaustive interpretation of the subordinate question *who came*.

(i) Jack knows who came, but he does not know who did not come.



### 4.3.1.2 The baseline theory

With the general background on questions introduced above, I briefly explain here how to obtain those results compositionally. The syntax-semantic mapping I assume follows the LF-oriented renditions of Karttunen's (1977) semantics in Stechow (1996) and Bittner (1998). First, *wh*-words denote existential quantifiers. For instance:

$$(90) \text{ a. } \llbracket \textit{who} \rrbracket = \lambda P. \exists x [\textit{person}(w)(x) \wedge P(x)]$$

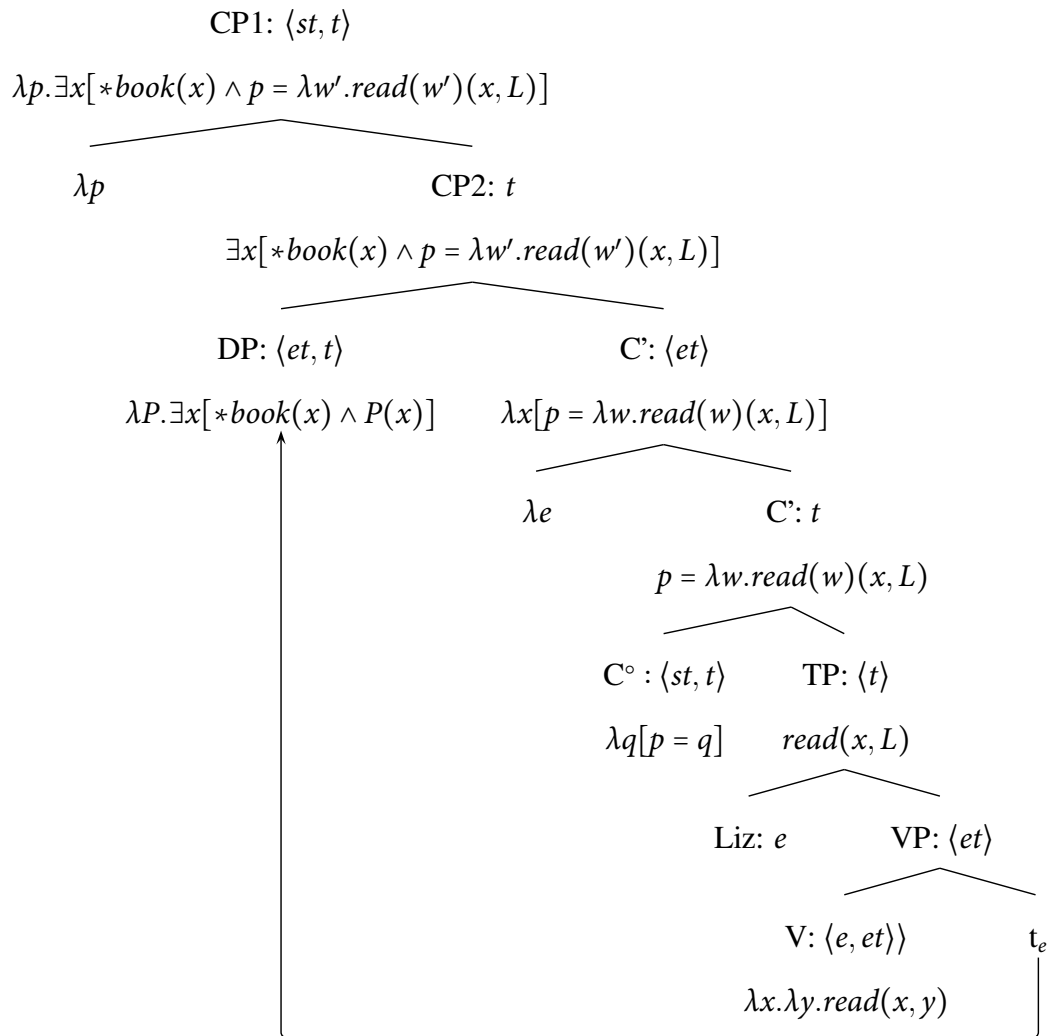
$$\text{ b. } \llbracket \textit{what} \rrbracket = \lambda P. \lambda Q. \exists x [P(w)(x) \wedge Q(w)(x)]$$

Following Stechow (1996), I define the denotation of the operator *Q* as an identity relation between propositions:

$$(91) \llbracket Q \rrbracket = \lambda p. \lambda q [p = q]$$

I will assume, with Karttunen (1977), that the locus of the question operator is on  $C^\circ$ , akin to his proto-question rule. With these pieces, the derivation of a simple question like (80a) is as follows:

(92) **LF derivation of *what books did Liz read?***



The *wh*-word, a quantifier, undergoes QR to [Spec,CP] and leaves an individual trace in TP. The only departure from Karttunen (1977) is on the top level. Moved elements are coindexed with their trace, in this case with a superscript that corresponds to the type of the trace. Notice also that the type of a trace left by a moved element corresponds to the type this moved element quantifies over. Finally, a variable left by a trace is  $\lambda$ -abstracted over immediately before the element is interpreted in its displaced position.

The CP level is the level at which “intensionalization” happens. This requires Intensional Functional Application, to allow the combination of the C° head which requires a propositional

argument, with the TP, which provides a truth-value. The result is again a truth-value, but now the world variable has been introduced and abstracted over the predicate.

As in Karttunen's (1977), the free propositional variable in CP2 is bound by a lambda operator, effectively creating a set of propositions.<sup>14</sup> The resulting interpretation of this LF is the desired proposition-set denotation of the question *what books did Liz read*, i.e. the Hamblin-set of propositions of the form “Liz read *x*”, where *x* is any book.<sup>15</sup> The last step is to filter out the false propositions. This is the task of the answerhood operator ANS-D, which applies to the meaning in CP1 and returns the maximal true answer:

$$\begin{array}{ccc}
 (93) & & \text{CP: } \langle s, st \rangle \\
 & & \lambda w. \iota p [p(w) \wedge \exists x [*book(x) \wedge p = \lambda w'.read(w')(x, L)]] \\
 & \swarrow & \searrow \\
 & \text{ANS-D} & \text{CP1: } \langle st, t \rangle \\
 & & \lambda p. \exists x [*book(x) \wedge p = \lambda w'.read(w')(x, L)]
 \end{array}$$

With respect to *how many* questions, the derivation proceeds in a similar fashion. The strategy I adopt is along the lines of Higginbotham (1993), Cresti (1995), Romero (1998) and others. The idea is to decompose *how many NP* phrases a *wh*-operator part and a *many NP* part. Thus, while the *wh*-operator takes scope, the nominal can be interpreted at different parts in the clause.<sup>16</sup> This keeps the semantics of *how many NP* maximally similar to the scope

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<sup>14</sup>This is known as Karttunen's (1977) “WH-Quantification Rule”.

<sup>15</sup>This is the *de re* reading: the extensional value of the *wh*-complement is evaluated under the actual world. I will not consider other interpretations of questions here; see Sharvit (2002) for a treatment of *de dicto* readings and Dayal (2017) for discussion.

<sup>16</sup>This is required for ambiguities like the following (Kroch 1989, Cinque 1990):

- (i) How many books does Chris want to buy?
  - a. What is the number *n* such that there are *n* books that Chris wants to buy?
  - b. What is the number *n* such that Chris wants it to be the case that there are *n* books that he wants to buy?

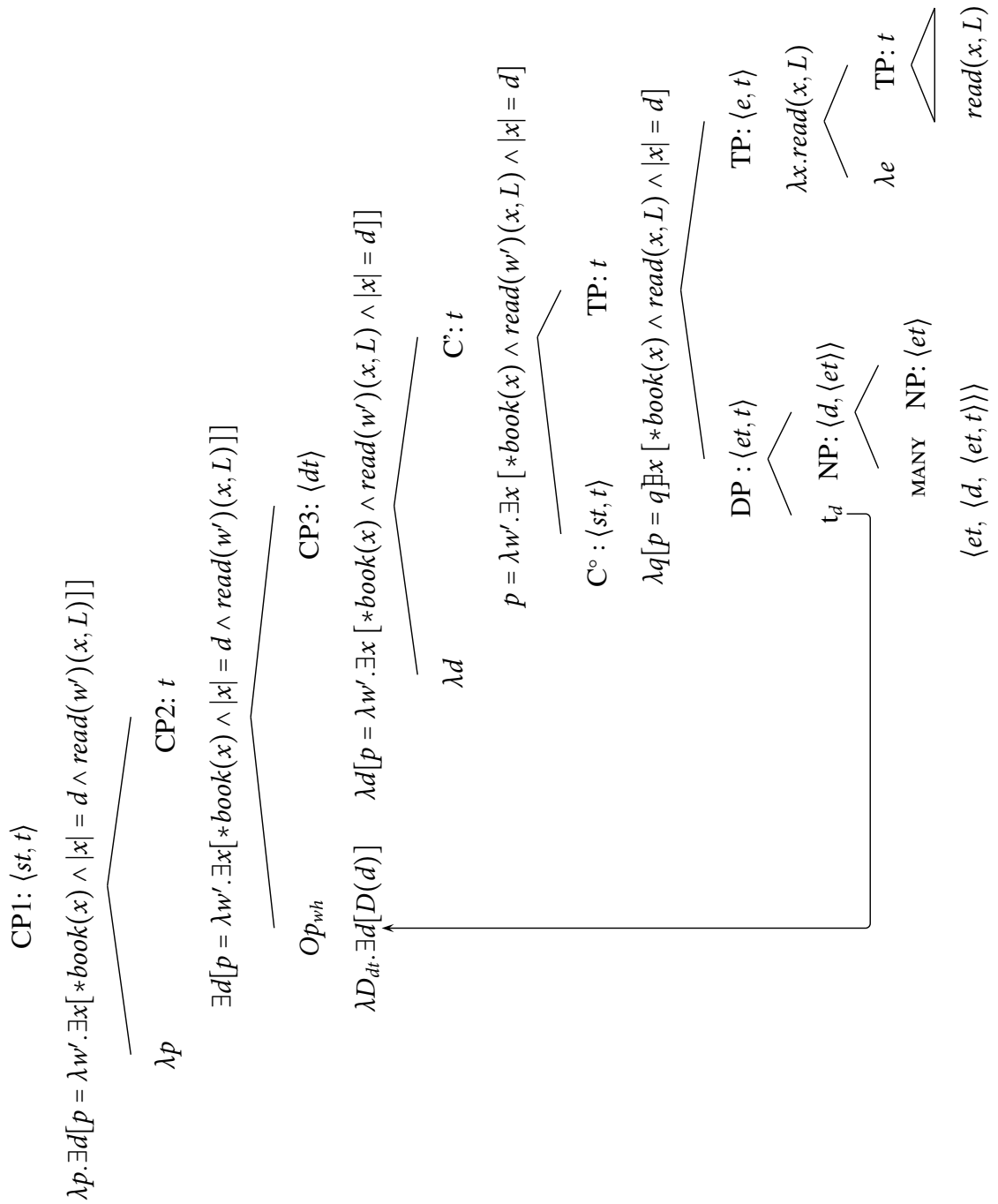
splitting structures usually assumed in the semantics of comparative quantifiers (e.g. Hackl 2000 a.o.). I define the two moving parts of *how many NP* as follows:

(94) a.  $\llbracket how \rrbracket = \lambda D_{\langle dt \rangle} . \exists d [D(d)]$

b.  $\llbracket MANY \rrbracket = \lambda P_{\langle et \rangle} . \lambda d . \lambda Q_{\langle et \rangle} . \exists x [P(x) \wedge Q(x) \wedge |x| = d]$

Thus, the LF for a question like *how many books did Liz read* is the following:

(95) LF derivation of *how many books did Liz read?*



### 4.3.2 Compositional analysis of propositional ARs

We are now well equipped to dive into how to map structures like propositional ARs to their semantic interpretation. Recall that the desiderata is to account for the wide range of

interpretations that propositional ARs are capable of delivering when they are complements to *wh*-constructions. I repeat here the relevant paradigm: a sentence like (8) may be interpreted in four different ways:<sup>17</sup>

(8) No sabes las manzanas que trajo Pedro el año pasado  
not know.2.SG the.FM.PL apples that brought Pedro the last year  
Lit.: ‘You don’t know the apples that Pedro brought last year

(9) a. OBJECT *interrogative*

You don’t know what are the apples that Pedro brought last year.

b. AMOUNT *interrogative*

You don’t know what is the amount of apples that Pedro brought last year.

c. OBJECT *exclamative*

The apples that Pedro brought last year exceeded the expectations of the speaker with respect to some property of apples.

d. AMOUNT *exclamative*

The amount of apples that Pedro brought last year exceeded the expectations of the speaker.

The plan for the rest of the section is the following: first I will spell out my proposed meaning for the definite article in its propositional variant  $D_{ANS}$ , and then present my account for propositional ARs when they are interpreted as subordinate questions. Then, I discuss the case of exclamatives and how they tie in with the proposed semantics for interrogatives and the definite article.

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<sup>17</sup>I am abstracting away from the *KIND* interpretation here and subsuming it under the *OBJECT* reading.

### 4.3.2.1 The semantics of the definite article

I have argued so far that propositional ARs are syntactically questions (and so different in this respect from concealed questions). The obvious question, then, is what to do with the definite article. This definite article, which I called  $D_{\text{ANS}}$  earlier, must apply to a CP that denotes a question.<sup>18</sup> Its function, therefore, is similar to the Answerhood operators proposed in Heim (1994) and Dayal (1996). The full lexical entry of  $D_{\text{ANS}}$  is below.<sup>19</sup>

$$(96) \quad \llbracket D_{\text{ANS}} \rrbracket = \lambda Q_{\langle st, t \rangle} . \lambda w : \exists p [Q(p) \wedge p(w) \wedge \forall q [[q(w) \wedge Q(q)] \rightarrow p \sqsubseteq q]] \\ \cdot \lambda p [Q(p) \wedge p(w) \wedge \forall q [[q(w) \wedge Q(q)] \rightarrow p \sqsubseteq q]]$$

The semantic task of  $D_{\text{ANS}}$  is the same as that of  $\text{ANS1}$  in Heim (1994) and  $\text{ANS-}D_w$  in Dayal (1996): it applies to a question denotation, the Hamblin-set  $Q$ , it presupposes the existence of a true proposition  $p$  in  $Q$  that entails all other true propositions, and returns that  $p$ . The similarities with the ordinary definite article are hard to miss.

### 4.3.2.2 Propositional ARs as answered questions

I have laid out my assumptions about the semantics of questions, and proposed an entry for the definite article that is compatible with question semantics. In what follows I put all the pieces together to show how they derive the range of interpretations observed in propositional ARs.

**4.3.2.2.1 Basic meanings** The compositional semantics of question-embedding sentences adopted here states that propositional ARs denote precisely that, propositions. The target interpretations of a sentence like (97) are in (98).

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<sup>18</sup>See examples in (65) above showing that the definite article can also combine with propositions.

<sup>19</sup>I follow the convention of introducing presuppositions with a colon after the last lambda term.

- (97) Juan sabe las manzanas que trajo Pedro el año pasado  
 Juan know the.FM.PL apples that brought Pedro the last year  
 Lit.: ‘Juan knows the apples that Pedro brought last year’

- (98) a. OBJECT *interrogative*

Juan knows what are the apples that Pedro brought last year.

- b. AMOUNT *interrogative*

Juan knows what is the amount of apples that Pedro brought last year.

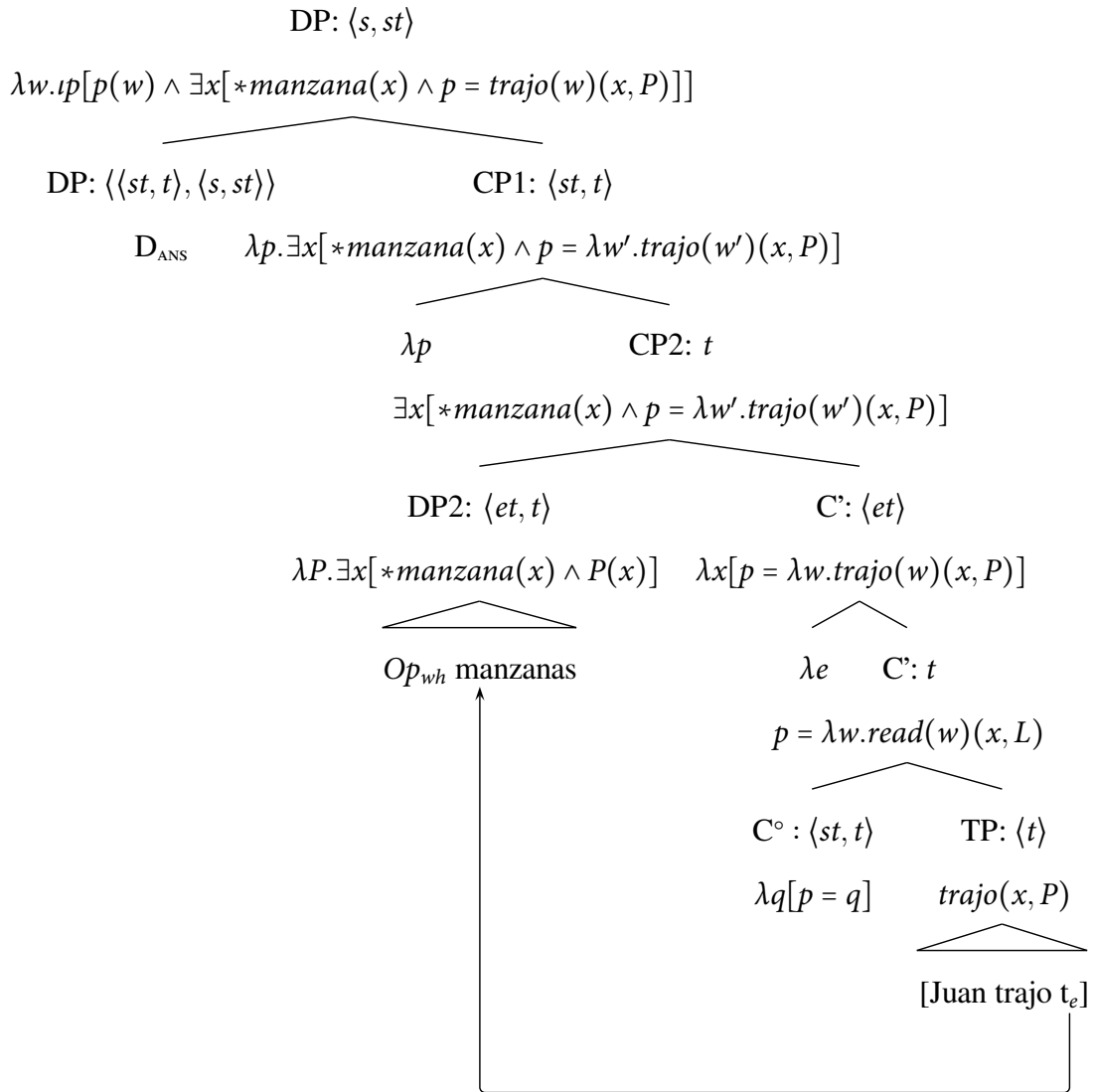
The derivation of the propositional AR *las manzanas que trajo Pedro* on its OBJECT interrogative interpretation goes along the lines described above for constituent questions. Syntactically, the only difference between propositional ARs and constituent questions is that (i) there is an overt determiner playing the role of an answerhood operator, (ii) the *wh*-operator is covert, and (iii) the complementizer is overt.

- (99)  $[_{DP1} \text{ las } [_{CP} [_{DP2} \text{ Op}_{wh} \text{ manzanas } ]_i [c' \text{ que}_{[+WH]} [ \text{trajo } ]_j [_{TP} \text{ Juan } t_j t_i ] ] ] ] ]$
- 

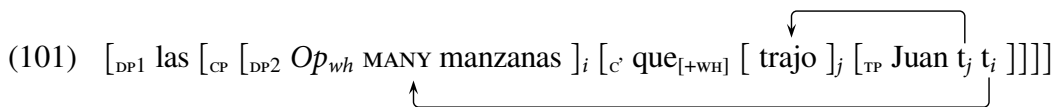
From a semantic standpoint, however, there are no differences. The full derivation is summarized below.



(100) **ОБЪЕКТ interpretation of propositional ARs**

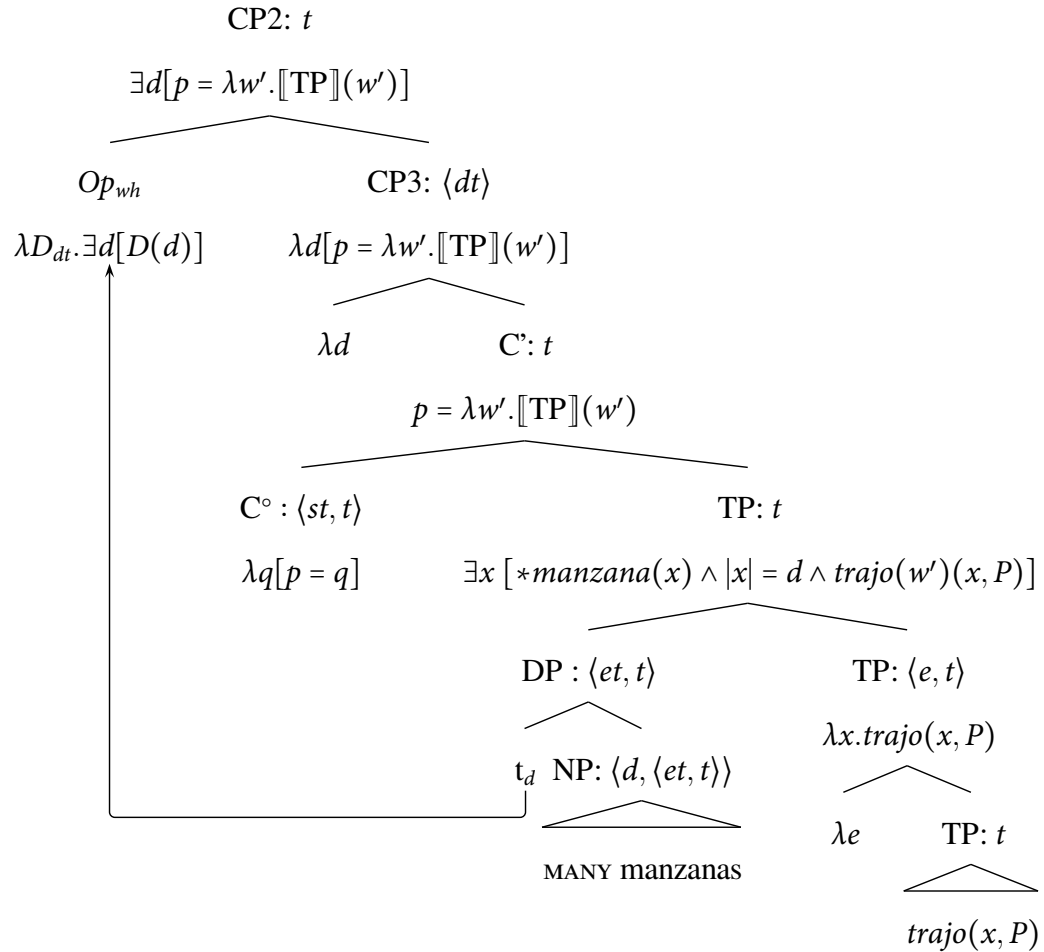


A similar derivation accounts for the AMOUNT interpretations of propositional ARs. In this case, the syntactic derivation echoes that of *how many* questions.



At LF, the cluster *how many NP*–*cuanto NP* in Spanish—is decomposed in a *wh*-operator and a *many NP* part. The derivation is summarized below: first, consider the interpretation of the *how many NP* phrase.

(102) **AMOUNT interpretation of propositional ARs –Part I**



The rest of the derivation proceeds as before: Karttunen’s (1977) WH-quantification rule applies first, and  $D_{ANS}$  applies to the resulting set of propositions.

(103) **AMOUNT interpretation of propositional ARs –Part II**

$$\begin{array}{c}
 \text{DP: } \langle s, st \rangle \\
 \lambda w. ip[p(w) \wedge \exists d[p = \exists x[*manzana(x) \wedge |x| = d \wedge trajo(w)(x, P)]]] \\
 \swarrow \quad \searrow \\
 \text{DP: } \langle \langle st, t \rangle, \langle s, st \rangle \rangle \quad \text{CP1: } \langle st, t \rangle \\
 \text{D}_{\text{ANS}} \quad \lambda p. \exists d[p = \lambda w'. [\text{TP}]](w')] \\
 \swarrow \quad \searrow \\
 \lambda p \quad \text{CP2: } t \\
 \exists d[p = \lambda w'. [\text{TP}]](w')]
 \end{array}$$

In each case, (100) and (103), the result is a function from worlds to propositions. The definite article  $D_{\text{ANS}}$  takes a CP denoting a set of propositions—either one of the CP1 in (100)/(102)—and returns the intension of the maximally informative proposition from that set.

$$(104) \quad \llbracket \text{DP} \rrbracket = \lambda w . ip[p(w) \wedge \llbracket \text{CP1} \rrbracket(p) \wedge \forall q[[q(w) \wedge \llbracket \text{CP1} \rrbracket(q)] \rightarrow p \subseteq q]]$$

**4.3.2.2.2 Embedding propositional ARs** Propositional ARs denote propositions, they are of type  $\langle st \rangle$ . The kind of predicates that can typically embed questions, however, usually take complements that denote sets of propositions. For instance, the usual lexical entry for question embedding *know* looks like this:

$$(105) \quad \llbracket \text{know} \rrbracket = \lambda Q_{\langle st, t \rangle} . \lambda x_e . \forall p[Q(p) \wedge p(w_0) \rightarrow \forall w' \in \text{Dox}_x(w_0)[p(w')]]$$

The obvious solution to solve the second logical option is to lift the type of propositional ARs to a set of propositions. This lifting may be carried out by adapting Partee's (1987) **IDENT** operator to operate over propositions.

$$(106) \quad \llbracket \text{Id} \rrbracket = \lambda p_{\langle st \rangle} . \lambda q[q = p]$$

$$(107) \quad \llbracket \text{Id} \rrbracket(\llbracket (100) \rrbracket) = \lambda q[q = \lambda w. ip[\exists x[*manzana(x) \wedge p = trajo(w)(x, P)]]]$$

We can now work with standard definitions for rogative and responsive predicates. The full interpretation of a propositional AR like (100) is as follows:

$$(108) \quad \llbracket \text{know} \rrbracket(\llbracket (100) \rrbracket)(\llbracket \text{Juan} \rrbracket) = \forall p[p = \iota q[\exists x[*\text{manzana}(x) \wedge q = \text{trajo}(w_0)(x, \text{Pedro})]] \\ \rightarrow \forall w' \in \text{Dox}_{w_0, \text{Juan}}[p(w')]]]$$

In the case of AMOUNT interpretations, we have the following.

$$(109) \quad \llbracket \text{know} \rrbracket(\llbracket (100) \rrbracket)(\llbracket \text{Juan} \rrbracket) \\ = \forall p[p = \iota q[\exists d[q = \exists x[*\text{manzana}(x) \wedge |x| = d \wedge \text{trajo}(w_0)(x, \text{Pedro})]]] \\ \rightarrow \forall w' \in \text{Dox}_{w_0, \text{Juan}}[p(w')]]]$$

An obvious question that remains unanswered concerns anti-rogative predicates like *think* and *believe*, which only take propositional (declarative) complements, and yet they are incompatible with propositional ARs.

$$(110) \quad * \text{Juan piensa las } \quad \text{manzanas que trajo } \quad \text{Pedro el } \quad \text{año pasado} \\ \text{Juan thinks the.FM.PL apples } \quad \text{that brought Pedro the last year}$$

In providing propositional ARs a propositional semantics we seem to lose the parallelism with questions when it comes to embeddability.

	QUESTION: $\langle st, t \rangle$	PROPOSITION: $\langle st \rangle$	propositional ARs: $\langle st \rangle$
rogative ( <i>ask, wonder</i> )	✓	✗	✓
responsive ( <i>know, tell</i> )	✓	✓	✓
anti-rogative ( <i>think, believe</i> )	✗	✓	✗

**Table 4.2.** Distribution propositional ARs with embeddind predicates

The derivation of the differences between the three types of predicates has occupied semanticists at least since Karttunen's (1977) work, and I will not be able to address the issue here

with the level of detail that it deserves.<sup>20</sup> Different assumption about the semantics of interrogative will face different aspects of this issue. An obvious alternative that goes around this problem is to provide a semantics for propositional ARs where they simply denote sets of propositions. This can be enforced either by incorporating  $\text{Id}$  into  $\text{D}_{\text{ANS}}$  or by giving  $\text{D}_{\text{ANS}}$  a different semantics altogether. Both these options however would take the meaning of  $\text{D}_{\text{ANS}}$  away from its ordinary nominal counterpart  $\text{D}_{\text{NOM}}$ . Another option, suggested to me by Seth Cable (pc.) is to place the burden of explaining the restriction of propositional ARs to anti-interrogative predicates on the [+Q] feature of the complementizer head. On this view,  $\text{D}_{\text{ANS}}$  would no longer be a syntactic head in the same way as other determiners are, and so it would not block subcategorization into its sister node. I will leave the task of finding a better solution than the one presented here for a future occasion.<sup>21</sup>

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<sup>20</sup>For recent discussions, see Uegaki (2015), Spector and Egré (2015), Xiang (2016), Theiler et al. (2016) and Dayal (2017).

<sup>21</sup>Predicates that embed exclaimatives can also be explained in the terms of the analysis of propositional ARs presented above. The price to pay, however, is the assumption that exclamative predicates can c-select for propositions. Thus, what follows should be taken as a demonstration of one way to conciliate the semantics of propositional ARs with exclamative predicates. As a case study, take factive emotive predicates with expletives like *it is surprising/amazing*, that can take both question and declarative embedding complements, but not ordinary DPs.

- (i) a. It is amazing {who came to the party / that Liz came to the party / \*the dog}.
- b. It is surprising {who came to the party / that Liz came to the party / \*the dog}.

With our current assumptions, we can make emotive predicates directly take propositional ARs. Assume for instance a general entry for this type of predicates (where  $\text{Exp}_{\text{Sp},x}$  stands for the set of worlds where the course of events proceeds as expected by speaker  $\text{Sp}$  in the evaluation world).

- (ii)  $[[\text{EMO}]] = \lambda p_{\langle \text{st} \rangle} . \lambda w . p(w) \wedge \forall w' [w' \in \text{Exp}_{w, \text{Sp}} \rightarrow \neg p(w')]$

The target interpretation states that the proposition denoted by the propositional AR is true in the evaluation world, but not in the “expectation” worlds of the speaker. This serves well as a basis for a subordinate exclamative. On top of this, we may want to add the emotive component of exclamations (cf. Castroviejo 2006, Chernilovskaya 2014 a.o.). The main takeaway is that we can directly extend our semantics of propositional ARs to (at least some) exclamative predicates by, (i) following the tradition that exclamations may be built up from question semantics (see Lahiri 2002, D’avis 2002, Abels 2007), and (ii) assuming that exclamative predicates c-select for propositions.

## 4.4 Conclusion

This chapter provides an account of ARs in Spanish when they appear as complements to *wh*-embedding predicates. From a syntactic standpoint, I have argued that propositional ARs are DPs with a full question embedded at the CP level. This conclusion is supported by a number of criteria presented in §4.1.3 (which in turn speak against the superficially more straightforward analysis in terms of concealed questions discussed in §4.5). From a semantic point of view, propositional ARs have the semantics of (answered) questions, in the spirit of Heim (1994), Dayal (1996) a.o. (and Zanuttini and Portner (2003) and Gutiérrez-Rexach 1996 for exclamatives). What is special about Spanish, then, is the presence of  $D_{ANS}$ , a version of the definite article that applies to questions (or propositional properties) and returns the maximally informative true answer. The conclusion is that ARs in Spanish belong to its own kind, but one that is not very far from other more familiar constructions.

## 4.5 Appendix: concealed questions?

### 4.5.1 An alternative approach

Propositional ARs are special in their “hybrid” nature: they seem to be DPs that nevertheless pattern with interrogatives. In these properties, they are reminiscent of concealed questions. Concealed questions are DPs that can appear embedded under (certain) question embedding verbs and have an interpretation equivalent to a question. As Baker (1968) originally noted, a sentence like (111a) is ambiguous between an acquaintance reading, which states that John is familiar with Rome, and a concealed question reading, expressed by the paraphrase in (111b).

(111) a. John knows the capital of Italy.

b. John knows what the capital of Italy is.

There are various tests showing that the DP in (111) in fact patterns with questions. For example, the verb *tell* in English varies with respect to factivity depending on whether its

complement is declarative or interrogative. Thus, whereas the embedded proposition in (112a) may be true or false irrespective of the factual events, (112b) entails that John told Sue about the actual state of affairs.

(112) a. John told Sue that it was raining.

b. John told Sue whether it was raining.

Using the same test, we can show that concealed questions pattern together with interrogatives. Thus, if (113a) is true, then neither (113b) nor (113c) can be true at the same time.

(113) a. John told Sue that London is the capital of Italy.

b. John told Sue the capital of Italy.

c. John told Sue what the capital of Italy is.

The property of concealed questions that is pertinent here is that they are ordinary DPs that appear in positions where questions (and exclamatives, see e.g. Grimshaw 1979) are expected, much like propositional ARs. This parallel raises the possibility that propositional ARs in Spanish are in fact concealed questions/exclamations. If so, we would need to posit no out-of-the-ordinary structure for propositional ARs: they are, syntactically, ordinary DPs restricted by relative clauses. If so, the same semantic machinery that is used to interpret concealed questions can yield the differences in interpretation, and account for the unusual external distribution of such nominals. In what follows, I will first show that at least in terms of the semantics, a concealed question analysis could derive the right interpretation for propositional ARs. However, such an account makes wrong predictions about the syntactic properties of propositional ARs. As will be shown below, propositional ARs and concealed questions in Spanish show very different patterns, suggesting that an interrogative semantics is insufficient to capture the properties of propositional ARs; they must have the structural properties of *wh*-constructions.

#### 4.5.2 Proof of concept

The goal of this subsection to show that a concealed question analysis for propositional ARs can yield the right meaning for these constructions.

The general strategy of the approach I present proceeds in two steps: first, an individual concept meaning is generated for the propositional AR (of type  $\langle se \rangle$ , a function from indices to individuals), and then a type-shifter extracts a proposition meaning out of the individual concept.<sup>22</sup> Take for instance a DP with a relative clause like the following, assuming a simple raising analysis of the relative clause (Kayne 1994).

$$(114) \text{ Pedro sabe } [_{\text{DP}} \text{ las } [_{\text{NP1}} [_{\text{NP2}} \text{ manzanas } ]_i [_{\text{CP}} \text{ que } [_{\text{TP}} \text{ Juan trajo } t_i ]]]]$$

Pedro knows      the                    apples                    that      Juan brought

The meaning of the highest NP is simply the property resulting from intersecting the NP *manzanas* and the CP.

$$(115) \llbracket \text{NP1} \rrbracket = \lambda x. \lambda w [ \text{manzanas}(w)(x) \wedge \text{trajo}(w)(x, \text{Juan}) ]$$

Assuming an intensional variant of the definite determiner, we can close the above property to get at the desired individual concept interpretation.

$$(116) \text{ a. } \llbracket \text{las} \rrbracket = \lambda P_{\langle e, st \rangle} = \lambda w. \iota x [ P(x)(w) ]$$

$$\text{ b. } \llbracket \text{DP} \rrbracket = \lambda w. \iota x [ \text{manzanas}(w)(x) \wedge \text{trajo}(w)(x, \text{Juan}) ]$$

The denotation of the DP consists of functions from world indices to plural individuals of apples that Juan brought, where the apples that Juan brought vary from world to world.

Individual concepts cannot directly combine with *wh*-embedding predicates because there is a sortal difference: these predicates cannot take complements of type  $\langle se \rangle$  (nor type *e* either).

For instance, assume the following meaning for the predicate *know*:

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<sup>22</sup>Employing type-shifters is not the only way to analyze concealed questions. For instance, evidence from quantified and indefinite concealed questions suggests that the type-shifter analysis is at best insufficient. Those matters do not concern us here however; see Nathan (2006) and Frana (2017) for discussion.



$$(117) \quad \llbracket know_Q \rrbracket = \lambda Q_{\langle st, t \rangle} . \lambda x_e . \forall p [Q(p) \wedge p(w_0) \rightarrow \forall w' \in Dox_x(w_0) [p(w')]]$$

Thus, we need some kind of repair. In this case, a type-shifter can do the job. We define a function that applies to individual concepts and returns sets of propositions (Nathan 2006).

$$(118) \quad ICtoP Shift \langle se \rangle \rightarrow \langle st, t \rangle: \\ \lambda y_{\langle se \rangle} . \lambda p_{\langle st \rangle} . \exists x_e [p = \lambda w . [y(w) = x]]$$

Now the meaning of *know* above can be applied to the output of the application of *ICtoP* to the DP.

$$(119) \quad \llbracket ICtoP \rrbracket (\llbracket DP_{\langle se \rangle} \rrbracket) = \lambda p . \exists x [p = \lambda w . \llbracket las manzanas que Juan trajo \rrbracket^w = x] \\ = \lambda p . \exists x [p = (\lambda w . \iota y [manzanas(w)(y) \wedge trajo(w)(y, Juan)] = x)]$$

The meaning of the resulting expression amounts to a set of propositions that vary only in the specification of the apples that Juan brought in each evaluation world.

$$(120) \quad \left\{ \begin{array}{l} \text{The apples that Juan brought are } a \oplus b \oplus c \text{ in } w_0, \\ \text{The apples that Juan brought are } d \oplus e \oplus f \oplus g \oplus h \text{ in } w_1, \\ \text{The apples that Juan brought are } i \oplus j \text{ in } w_2, \\ \dots \end{array} \right\}$$

Applied to the meaning of *know* in (117), we get at the desired interpretation:

$$(121) \quad \llbracket Pedro sabe ICtoP([\text{rc las manzanas que trajo Juan}]]^{w_0} \rrbracket \\ = \forall p [\exists x [p = (\lambda w' . \llbracket las manzanas que trajo Juan \rrbracket^{w'} = x) \wedge p(w_0) \\ \rightarrow \forall w' \in Dox_f(w_0) [p(w')]]] \\ = \forall p [\exists x [p = (\lambda w' . \iota y [manzanas(w')(y) \wedge trajo(w')(y, Juan)] = x) \wedge p(w_0) \\ \rightarrow \forall w' \in Dox_f(w_0) [p(w')]]]$$

The resulting expression above is true *iff* for every proposition *p* of the form *the apples that Juan brought are x* that is true in  $w_0$ , *p* is also true in all the worlds compatible with Pedro's beliefs. That is, Pedro knows the answer to the question: *what are the apples that Juan*

*brought?* This strategy interprets the relative clause as a concealed specificational copular question (Romero 2005, Frana 2017).

This accounts for the OBJECT interpretation of propositional ARs, but a minimal extension to AMOUNT interpretations is possible as well. Intuitively, we need an “amount concept” to achieve this result, a function from indices to degrees—of type  $\langle sd \rangle$ —from which we can extract a question about an amount.

To do so, assume the presence of a silent MANY predicate. This null MANY applies to properties and measures them along some dimension. For our purposes, it suffices to set MANY to measure individuals and return their cardinality.

$$(122) \quad \llbracket \text{MANY} \rrbracket = \lambda P_{\langle e, st \rangle} . \lambda Q_{\langle e, st \rangle} . \lambda d . \lambda w . \exists x [P(w)(x) \wedge Q(w)(x) \wedge |x| = d]$$

Here MANY is a higher-order predicate modifier that takes any two properties  $P$  and  $Q$  and returns a function from degrees to propositions such that there is an  $x$  in the extension of  $P$  and  $Q$  and  $x$  is of cardinality  $d$ . Syntactically, MANY raises from the CP internal position together with the NP and leaves a trace of the same type as the object it quantifies over (type  $e$  in this case).

$$(123) \quad \llbracket \text{DP Pedro} \llbracket \text{VP sabe} \llbracket \text{DP las} \llbracket \text{NP1} \llbracket \text{NP2 MANY manzanas} \rrbracket_i \llbracket \text{CP que} \llbracket \text{TP Juan trajo } t_i \rrbracket \rrbracket \rrbracket \rrbracket \rrbracket$$

We must provide now versions of the definite article and the type-shifter that are parametrized to degrees, rather than individuals.

$$(124) \quad \llbracket \text{las} \rrbracket = \lambda P_{\langle d, st \rangle} . \lambda w . \lambda d [P(w)(d)]$$

$$(125) \quad \text{ACtoP Shift } \langle sd \rangle \rightarrow \langle st, t \rangle: \\ \lambda d_{\langle sd \rangle} . \lambda p_{\langle st \rangle} . \exists d' [p = \lambda w [d(w) = d']]$$

Taking these adjustments into consideration, the meaning of the full DP before the application of the shifter *ACtoP* is represented below.

- (126) a.  $\llbracket NP2 \rrbracket = \lambda Q_{(e,st)}. \lambda d. \lambda w. \exists x [manzanas(w)(x) \wedge Q(w)(x) \wedge |x| = d]$   
 b.  $\llbracket NP1 \rrbracket = \lambda d. \lambda w. \exists x [manzanas(w)(x) \wedge traje(w)(Juan, x) \wedge |x| = d]$   
 c.  $\llbracket DP \rrbracket = \lambda w. id[\exists x[manzanas(w)(x) \wedge traje(w)(Juan, x) \wedge |x| = d]]$

After the application of the shifter, we arrive at (127b):

- (127) a.  $\llbracket ACtoP \rrbracket(\llbracket DP_{(sd)} \rrbracket) = \lambda p. \exists d[p = \lambda w. \llbracket las manzanas que Juan traje \rrbracket^w = d]$   
 b.  $\lambda p. \exists d[p = \lambda w. (id'[\exists x[manzanas(w)(x) \wedge traje(w)(x, Juan) \wedge |x| = d']])] = d]$

As before, the meaning of this expression is a set of propositions:<sup>23</sup>

$$(128) \left\{ \begin{array}{l} \text{The number of apples that Juan brought is 1,} \\ \text{The number of apples that Juan brought are 2,} \\ \text{The number of apples that Juan brought are 3,} \\ \dots \end{array} \right\}$$

This meaning can be taken by predicates like *know*, as defined in (117).

$$(129) \llbracket \text{Pedro sabe } ACtoP(\llbracket_{rc} \text{ las manzanas que traje Juan} \rrbracket) \rrbracket^{w_0}$$

$$= \forall p[\exists d[p = (\lambda w'. \llbracket las manzanas que traje Juan \rrbracket^{w'} = d) \wedge p(w_0)]$$

$$\rightarrow \forall w' \in Dox_j(w_0)[p(w')]]]$$

$$= \forall p[\exists d[p = (\lambda w'. id'[manzanas(w')(y) \wedge traje(w')(y, Juan) \wedge |y| = d'] = d) \wedge p(w_0)]$$

$$\rightarrow \forall w' \in Dox_j(w_0)[p(w')]]]$$

In this case, what Pedro knows is the answer to the question: *what is the cardinality of the apples that Juan brought?* This is the correct target meaning for the AMOUNT interpretation, a question not about individual apples, but about amounts of apples.

<sup>23</sup>The type shifters that we have introduced above in (118)/(125) rely on the semantics that Romero (2005) provides for the copula in specificational copular sentences. Thus, in the set of propositions of (128), the number after the copula cannot be predicative, it must be a number name. This is accordance with the Fregean view that noun phrases like *the number of planets* and simple numerals like *eight* are singular terms referring to numbers as abstract objects (Frege 1884). There are, however, many criticisms to this position; see Knowles (2015) and Moltmann (2016) for two recent ones.

### 4.5.3 Assessment

A concealed question analysis, however feasible semantically, is not empirically adequate in Spanish, as a comparison of propositional ARs and genuine concealed questions in Spanish reveals. Syntactically, concealed questions are nothing more than the DP they outwardly seem to be, and consequently, pattern with nominals and not with *wh*-constructions in the environments we had seen in §4.1.3. For instance, a DP that is interpreted as a concealed question nevertheless triggers number agreement in the expected way, in contrast to propositional ARs, where we find agreement mismatches.

#### (35b) Agreement mismatch in propositional ARs

Se le ha olvidado los mejillones que ha pedido Juan.  
refl PR.DAT aux. 3.SG forgotten the.MS.PL mussel.MS.PL that Juan ordered  
'He has forgotten how many mussels John ordered'

#### (130) No agreement mismatch in concealed questions

Se le { han / \*ha } olvidado las capitales de Europa.  
refl PR.DAT aux.3.PL aux.3.SG forgotten the.FM.PL capital.FM.PL of Europe  
'He has forgotten what are the capital cities of Europe'

In addition, concealed questions, unlike propositional ARs and genuine interrogatives, do not require obligatory inversion, as shown by the contrast below.

#### (131) a. *SV inversion*

Yo sé las manzanas que trajo Pedro  
I know the.FM.PL apples that brought Pedro  
'I know {what/how many} apples Pedro brought'

#### b. *No SV inversion*

Yo sé las manzanas que Pedro trajo  
I know the.FM.PL apples that Pedro brought

'I know {what/#how many} Pedro apples brought'

These divergences in syntactic behavior suggests that a proper treatment of propositional ARs involves not just a question interpretation, but also the internal structure of a *wh*-construction.

## CHAPTER 5

### DEGREE NEUTER RELATIVE CLAUSES

In the previous two chapters, I discussed two types of ARs in Spanish that share a common core, but differ in whether they are propositional or nominal in nature. The duality of ARs in Spanish, I argued, is reminiscent of the connection between *wh*-constructions and free relatives. This chapter discusses yet another construction in Spanish which can be characterized as having dual forms, one propositional and one nominal. The construction in question is a different sort of quantity-oriented relative clause, where the clause is headed by a gradable predicate of any syntactic category and the form *lo*.<sup>1</sup> Sentences involving such constructions uniformly have a DEGREE interpretation.<sup>2</sup>

- (1) Juan admiró lo hermosa que era la novela  
Juan admired LO beautiful.FM.SG that was the novel.FM.SG  
'Juan admired how beautiful the novel was'

---

<sup>1</sup>The morpheme *lo* has received a great deal of attention in the Spanish literature. Its form, reminiscent of the definite articles *el* and *la*, suggests that it is simply a neuter variant of the definite article. The lack of neuter declensions in Spanish nominals, however, raises questions about why the language would have a neuter determiner in the first place. There are at least three main analyses of *lo* that have been proposed:

- (i) a. *Lo* is a definite article used as a nominalizer of adjective, adverb, prepositional and propositional phrases (Gil y Gaya 1964, Alarcos Llorach 1967, Álvarez Martínez 1986, a.o).  
b. *Lo* is a definite article that specifically applies to null heads (Contreras 1973, Plann 1980, a.o.).  
c. *Lo* is a pronoun (Bello 1847, Ojeda 1982, Bosque and Moreno 1990, a.o.).

I will not take a stance on the best syntactic characterization of *lo*, glossing it simply as LO throughout. What is important for our purposes is that the morpheme has definite semantics, which is something that all analyses take for granted (for discussion, see Bosque and Moreno (1990), Ojeda 1993 and especially Gutiérrez-Rexach (1999, 2014) with respect to Degree Neuter Relatives.

<sup>2</sup>Recall from the introductory chapter that DEGREE and AMOUNT interpretations are two sides of the same coin: amounts are simply DEGREE interpretations in the cardinality scale.

Following Rivero (1981) and Ojeda (1982), I refer to these constructions as Degree Neuter Relatives (DNRs for short).

DNRs are interesting both for their cross-linguistic rarity and for their distribution within Spanish. Regarding the first point, many languages, for instance English, lack DNRs altogether, as exemplified by (2), and can only express the intended meaning using overt *wh*-pronouns, as in (3).

(2) a. \*Jose admired the beautiful the novel was.

b. \*Jose did not understand the idiot that Mariano is.

(3) a. Jose admired how beautiful the novel was.

b. Jose did not understand what an idiot Mariano is.

Notice that Spanish also has the variant with overt *wh*-pronouns.

(4) Jose admiró cuán hermosa era la novela

Jose admired how beautiful.FM.SG was the novel.FM.SG

'Jose admired how beautiful the novel was'

Secondly, DNRs appear not only in positions where adjectival and nominal predicates can ordinarily appear, but also in some environments where such expressions are normally illicit, e.g. as complements to *wh*-embedding predicates. In raising this distributional puzzle, DNRs are reminiscent of propositional ARs (*vs.* nominal ARs) and this parallelism will be my starting point. The main goal of this chapter is to show that given the machinery I argued Spanish must possess so as to construct ARs, the existence of DNRs in the language is unsurprising, and DNRs can in fact be understood as a species of ARs. The only difference between DNRs and the ARs discussed in Chapters 4 and 3 lies in what pieces of the structure get pronounced.

The remainder of this chapter will proceed as follows. Section 5.1 will discuss the internal make-up and distribution of DNRs. In §5.2, I will argue that DNRs come in two varieties,

much like ARs, and show in Section 5.3 how my previous analyses for nominal and propositional ARs can be readily extended to DNRs.

## 5.1 The basics

### 5.1.1 Two distinctive properties

Two syntactic properties of DNRs make them stand out among relativization strategies found in natural languages, including Spanish. The first is the surprising determiner-noun agreement pattern they show. Ordinarily in Spanish, definite articles that appear with headed relative clauses must agree in number and gender with the head noun, as illustrated in (5).

- (5) Juan admiró { las / \*la / \*los } fotografías que mostró  
 Juan admired the.FM.PL the.FM.SG the.MS.PL photograph.FM.PL that showed

Jose

Jose

‘Juan admired the photographs that Jose showed’

DNRs, however, do not seem to abide by this requirement. They uniformly require *lo*, irrespective of the gender and number features on the fronted predicate.

- (6) a. Juan admiró { lo / \*la } hermosa que era la novela  
 Juan admired LO the.FM.SG beautiful.FM.SG that was the.FM.SG novel.FM.SG

- b. Juan admiró { lo / \*el } hermoso que era el cuadro  
 Juan admired LO the.MS.SG beautiful.MS.SG that was the.MS.SG painting.MS.SG

The predicate heading the relative clause, however, must agree with material internal to the relative clause, suggesting that agreement is not altogether disrupted in these constructions.



- (7) a. Juan admiró lo { hermosa / \*hermoso } que era el  
 Juan admired LO beautiful.FM.SG beautiful.NT that was the.MS.SG  
 cuadro  
 painting.MS.SG
- b. Juan admiró lo { hermosas / \*hermoso } que eran las  
 Juan admited LO beautiful.FM.SG beautiful.NT that was the.FM.PL  
 novelas  
 novel.FM.PL

Rather, the patterns suggest that the head predicate has its origins inside the relative clause and is, for some reason, inaccessible for  $\varphi$ -agreement for elements outside of that clause, like the definite article.

The second unique property of DNRs is their syntactic flexibility: it is possible to construct DNRs headed by predicates belonging to a variety of syntactic categories, as illustrated by (8) below.

(8) a. **Adjectival**

Juan no entendió lo hermosa que era la novela.  
 Juan not understood LO beautiful.FM.SG that was D.FM.SG novel.FM.SG  
 ‘Juan did not understand how beautiful the novel was’

b. **Adverbial**

Juan admiró lo rápidamente que llegó María.  
 Juan admired LO rapidly that arrived María  
 ‘Juan admired how fast María arrived’

c. **Nominal**

Juan vió lo idiota que es Mariano.

Juan saw LO that idiot is Mariano

‘Juan saw what an idiot Mariano is’

d. **Prepositional**

Me molestó lo en punto que llegó Juan.

I.DAT annoyed LO on point that arrived Juan

‘It annoyed me how punctually Juan arrived’

Restrictions, where they exist, seem to be semantic in nature. Whereas adjectives that are predicative in nature can form good DNRs, non-predicative adjectives like *alleged* and *former* cannot:

(9) a. \*No me creo lo supuesto que es el asesino del presidente.

not I.DAT believe LO alleged that is the killer of the president

‘I do not believe how alleged is the killer of the president’

b. \*Lo { anterior / final } que está ese hombre en la fila.

LO former final that is that man in the line

‘How { former / final } is that man in the line’

Moreover, as suggested by Contreras (1973) and Gutiérrez-Rexach (1999), another necessary factor for forming DNRs is the gradability of the predicate in question. In general, any predicate phrase that is coercible into a gradable interpretation is grammatical, like, for instance, *American* and *red* in the examples below.

(10) a. Es gracioso lo Americano que se ha vuelto desde su viaje.

be funny LO American that refl. aux. become since his trip

‘It’s funny how American he has become since her trip’

- b. No vi lo rojo que se puso.  
 not see LO red refl. turn  
 ‘I didn’t see how red he turned’

However, even predicative expressions cannot form DNRs if they are not easily coercible into a gradable predicate.

- (11) a. \*lo ayer que hemos llegado  
 LO yesterday that aux. come  
 ‘How yesterday we have arrived’
- b. \*lo casa que me parece esta construcción  
 LO COUS that I.DAT seem this construction  
 ‘How house this building looks to me’
- c. \*lo desde la ventana que cayó la botella  
 LO from the window that fell the bottle  
 ‘How from the window this bottle fell’

### 5.1.2 Syntactic distribution

DNRs can chiefly appear in two environments, in predicational copular sentences and as complements to *wh*-embedding predicates. Henceforth, I will refer to DNRs appearing in predicative positions as “predicative DNRs” and those appearing with *wh*-embedding verbs as “propositional DNRs”.

In predicative DNRs, the DNR is predicated of some individual in a predicational copular sentence, as in (12).

- (12) a. Juan no es lo alto que Pedro es.  
 Juan no is LO tall that Pedro is  
 ‘Juan isn’t as tall as Pedro’

- b. El segundo libro es lo entretenido que fue el primero.  
 the second book is LO entertaining that was the first  
 ‘The second book is as entertaining as the first one’

But by far the more common use of DNRs is when they appear as complements to *wh*-embedding predicates. They may appear with rogative and responsive predicates, but not with anti-rogative predicates. As illustrated below, the meaning of DNRs in these constructions is equivalent to that of their counterparts with overt *wh*-elements.<sup>3</sup>

(13) **Rogative predicates**

- a. *Subordinate questions*

Me { preguntó pregunto } cuán alto es el edificio.  
 I.DAT asked wondered how tall is the  
 ‘{He asked me / I wonder} how tall the building is’

- b. *Degree Neuter Relative*

Me { preguntó pregunto } lo alto que es el edificio.  
 I.DAT asked wondered LO tall is the building

(14) **Responsive predicates**

- a. *Subordinate questions*

Yo { sé / te dije } cuán alto es el edificio.  
 I know you.DAT told how tall is the building  
 ‘I {know/told you} how tall the building is’

---

<sup>3</sup>Throughout this chapter I use the *wh*-pronoun *cuán* for subordinate questions. This pronoun is more commonly used in American variants of Spanish; in Peninsular Spanish it is more often found in literary texts, and the more common variant of the *wh*-pronoun is *cómo de* (cf. *qué tanto* in Central American varieties).

b. *Degree Neuter Relative*

Yo { sé / te dije } lo alto que es el edificio.

I know you.DAT tell LO tall that is the building

(15) **Anti-rogative predicates**

a. *Subordinate Questions*

\*Yo { creo / pienso / afirmo } cuán alto es el edificio

I believe think claim how tall is the building

Int.: 'I {believe/think/claim} how tall is the building'

b. *Degree Neuter Relative*

\*Yo { creo / pienso / afirmo } lo alto que es el edificio

I believe think claim LO tall that is the building

Finally, DNRs are also grammatical and felicitous as complements to predicates that embed exclamatives (16).

(16) a. *Post-verbal subjects*

Me sorprendió { cuán alto / lo alto que } es el edificio.

I.DAT surprised how tall LO tall that is the building

'It surprised me how tall the building is'

b. *Impersonal*

Es sorprendente { cuán alto / lo alto que } es el edificio.

is surprising how tall LO tall that is the building

'It is surprising how tall the building is'

## 5.2 Distributional puzzle

DNRs raise the same problems of composition that we grappled with in the previous chapters with ARs: how does the same expression appear in positions that require fundamentally different semantic objects? I suggest the problem with DNRs and ARs is one and the same, and in the next section, a parallel solution is applied to DNRs.

There are several reasons to treat DNRs on par with ARs. First, DNRs, like ARs, require the definite article, as shown in (17). Recall that the restriction to the definite article is a definitional property of ARs generally (see e.g. Carlson 1977a and Chapter 1).

- (17) a. Me pregunto { lo / \*esto / \*mucho / \*algo } alto que es el  
I.DAT wonder LO this.NT much.NT some.ALGO tall that is the  
edificio.  
building  
'I wonder how tall the building is'
- b. \*Me pregunto todo lo alto que es el edificio.  
I.DAT wonder all LO tall that is the building

Second, the relative clause is obligatory in DNRs, as it is in ARs. In the case of DNRs, what is left after dropping the relative clause is a nominalized gradable predicate, which is ungrammatical either as a complement to a *wh*-embedding predicate or in predicative position.

- (18) a. Yo me pregunto lo alta \*(que es la casa).  
I I.DAT wonder LO high.FM.SG that is the house  
'I wonder how high is the house'
- b. El segundo libro es lo entretenido \*(que fue el primero).  
the second book is LO entertaining.MS.SG that was the first  
'The second book is as entertaining as the first one'

Propositional DNRs, furthermore, behave much like propositional ARs showing obligatory SV inversion in the same environments.

- (19) a. \*Me pregunto lo difícil que { \*el examen es / es el examen} .  
 I.DAT wonder LO difficult.MS.SG that the exam be  
 ‘I wonder how difficult the exam is’
- b. \*Me sorprendió lo travieso que { \*ese niño es / es ese niño} .  
 I.DAT wonder LO naughty.MS.SG that that child is  
 ‘It surprised me how naughty that child is’

Unsurprisingly, the counterpart to DNRs with overt *wh*-pronouns shows the same requirement.

- (20) a. Me pregunto cuán difícil { \*el examen será / será el examen} .  
 I.DAT wonder how difficult.MS.SG the exam be.FUT  
 ‘I wonder how difficult the exam will be’
- b. Me sorprendió cuán travieso { \*ese niño es / es ese niño} .  
 I.DAT surprise how naughty.MS.SG that child is  
 ‘It surprised me how naughty that child is’

### 5.3 Extending the analysis to Degree Relatives

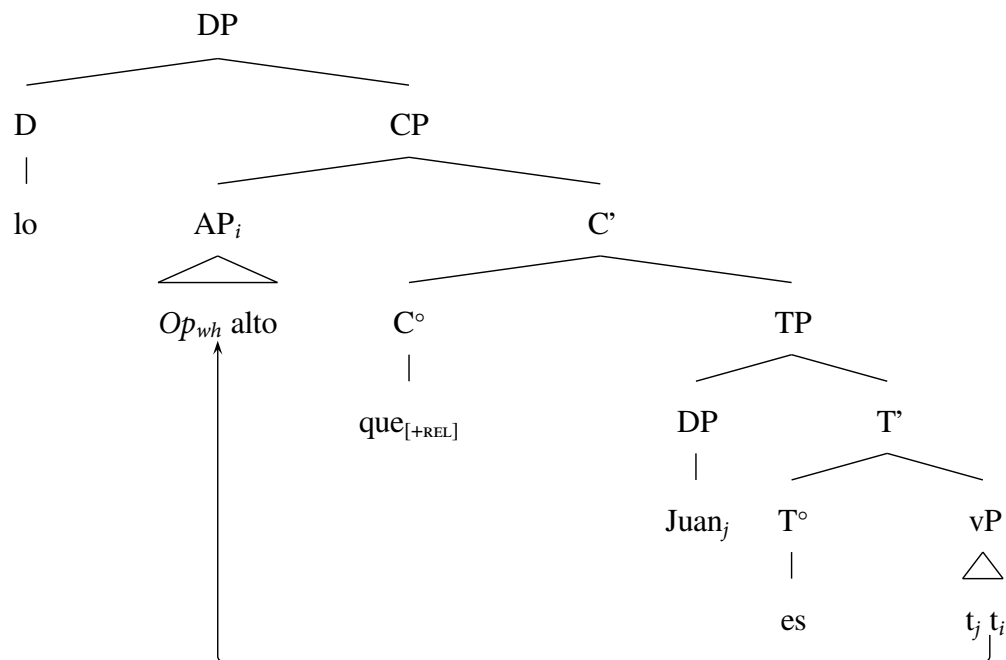
Previous analyses of DNRs, most notably Ojeda (1982, 1993) and Gutiérrez-Rexach (1999), have treated DNRs as syntactically and semantically uniform and as ordinary relative clauses, which are then interpreted as a maximalized object of either type *e* (Ojeda 1982, 1993) or type *d* (Gutiérrez-Rexach 1999). In contrast to these analyses, and echoing my take on ARs in the previous chapters, I suggest that DNRs come in two closely-related but also fundamentally different variants: those that complement verbs that take nominal complements, and those that complement verbs that typically take *wh* complements. In what

follows, I show that the analysis of nominal ARs extends directly to predicative DNRs, and the analysis of propositional ARs can be adopted wholesale to explain the distribution and interpretive properties of propositional DNRs.

### 5.3.1 Predicative DNRs

For predicative DNRs in Spanish I propose a syntactic structure that is completely analogous to the one defended in the previous chapter for nominal ARs. Thus, for a DNR like *lo alto que Juan es* (“the tall that Juan is”), we have the structure in (21). Note that this structure is very similar to the one proposed by Gutiérrez-Rexach (1999, 48) on his analysis of DNRs.

(21) Syntactic structure of predicative DNRs in Spanish



From a semantic standpoint, I adopt a fairly standard degree approach to gradable predicates where they denote relations between degrees and properties, of type  $\langle d, et \rangle$  (for an extensive overview, see Morzycki 2016). The meaning of *tall* can be represented as follows.

$$(22) \llbracket tall \rrbracket = \lambda d. \lambda x. tall(d, x)$$



Following the long tradition on ARs, we can take the CP in (21) to denote the set of degrees  $d$  such that Juan is  $d$ -tall.

$$(23) \quad \llbracket [\text{CP Juan is } d\text{-tall}] \rrbracket = \lambda d.tall(d, Juan)$$

This result can be achieved in a number of ways. For simplicity, I will assume that the gradable predicate is always interpreted in its base position, thus combining first with the trace of  $Op_{wh}$ , of type  $d$ . This is schematized below:

$$(24) \quad \begin{array}{c} \text{CP: } \langle dt \rangle \\ \lambda d.tall(d, Juan) \\ \swarrow \quad \searrow \\ \lambda d \quad \text{TP: } t \\ \quad \quad \quad tall(d, Juan) \\ \quad \quad \quad \swarrow \quad \searrow \\ \text{DP: } e \quad \quad \text{T': } \langle et \rangle \\ \text{Juan} \quad \quad \lambda x.tall(d, x) \end{array}$$

The last step is simply to interpret  $lo$ . In this case, I will give  $lo$  a semantics that applies to sets of degrees (already defined in Chapter 3, §3.4). Following the lead of Gutiérrez-Rexach (1996, 1999, 2014), I assume that  $lo$  has the semantics of the maximality operator discussed earlier (see §3.4.1).

$$(25) \quad \llbracket [\text{MAX}] \rrbracket = \lambda N_{\langle dt \rangle} . \iota n[N(n) \wedge \forall n'[N(n') \rightarrow n' < n]]$$

The interpretation of the LF corresponding to (21) amounts to the maximal degree  $d$  to which Juan is  $d$ -tall.

(26)  $[[DP]] = [[MAX]]([[CP]]) = MAX(\lambda d.tall(d, Juan))$

So far these results reproduce the results obtained by previous studies, which stop here and do not consider how DNRs should further combine with the matrix predicate. That is, what should we do with the maximal degree in (26) in a sentence like (12)?

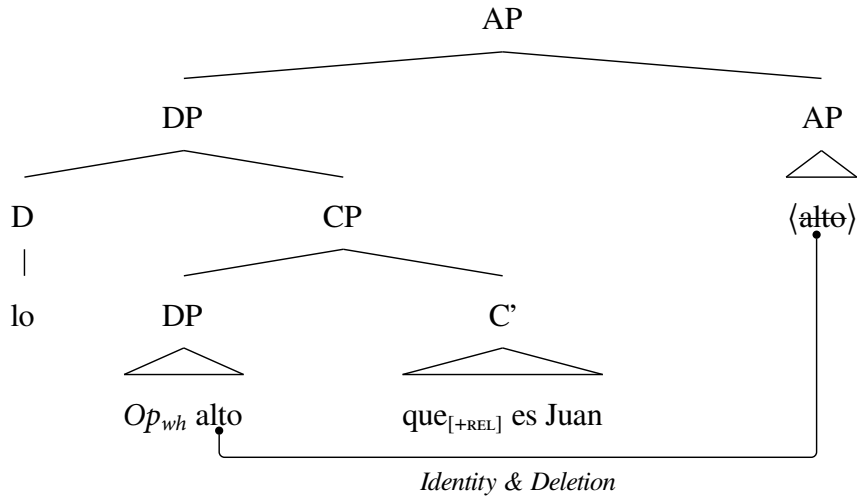
(27) Pedro es lo alto que es Juan.

Pedro is the tall that is Juan

'Pedro is as tall as Juan'

The solution I propose is the same as that we saw for nominal ARs. Thus, I suggest that the role DP is to provide the degree that saturates the degree slot of a second, unpronounced adjective.

(28) **AP elision in predicative DNRs**



The role of the DP can be regarded as the contribution of a Measure Phrase, like in *six-foot tall*.<sup>4</sup> The existence of the unpronounced AP gains support from the fact that they are sometimes pronounced, as pointed out earlier in §3.4.2.2 and repeated below.

<sup>4</sup>A common assumption in the literature is that measure phrases like *six feet* are names of degrees, of type *d*. Under this view, the meaning of a simple sentence like *Liz is six feet tall* is straightforward with our current assumptions.

(29) Juan no es lo que es Pedro de alto.

Juan not is LO that is Pedro of tall

‘Juan is not as tall as Pedro’

Moreover, the matching between the two copies of the gradable predicate must be absolute. For instance, since predicative adjectives must agree with their subjects in Spanish, it is easy to create a GENDER mismatch in examples like (12). These mismatches, however, result in ungrammaticality:

(30) a. \*Juan no es lo { alto / alta } que es María.

Juan not is LO tall.MS tall.FM that is María

‘Juan is not as tall as María’

b. \*María no es lo { alto / alta } que es Juan

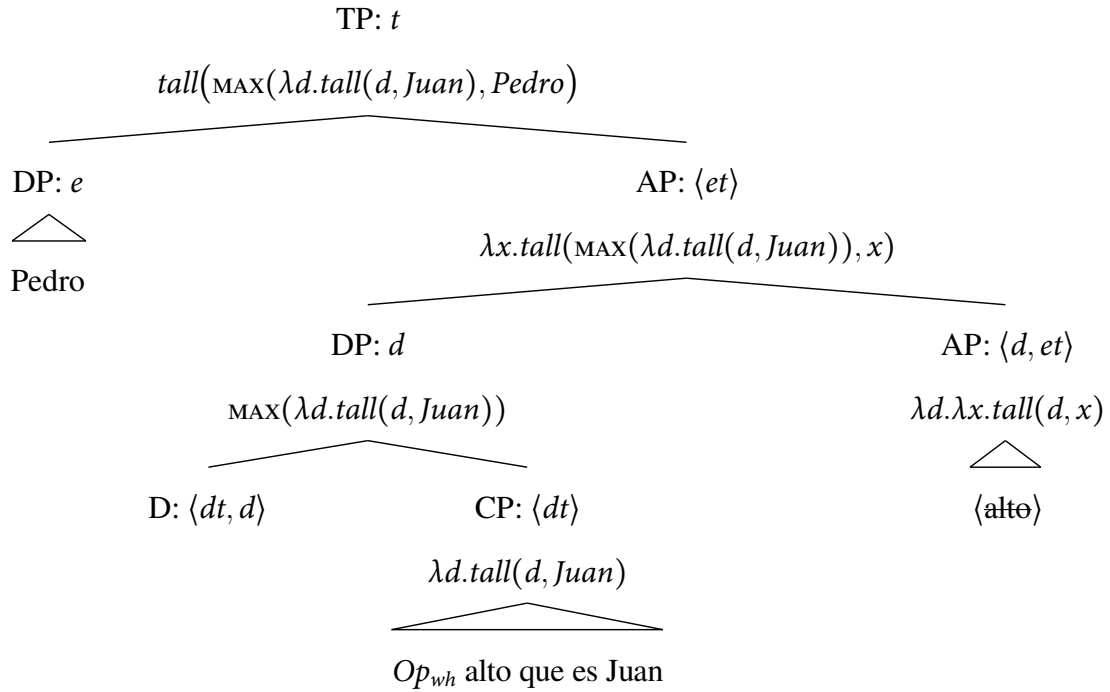
María not is LO tall.MS tall.FM that is Juan

‘María is not as tall as Juan’

What is important for us is that the present structure, independently motivated by nominal ARs, does not require any further ado to derive the right semantics for predicative DNRs. The full derivation is sketched below.

- 
- (i) a.  $\llbracket \text{six-feet tall} \rrbracket = \llbracket \text{tall} \rrbracket(\llbracket 6'' \rrbracket) = \lambda x. \text{tall}(6'', x)$   
b.  $\llbracket \text{Liz is six-feet tall} \rrbracket = \llbracket \text{is } 6'' \text{ tall} \rrbracket(\llbracket \text{Liz} \rrbracket) = \text{tall}(6'', \text{Liz})$

(31) **Interpretation of predicative DNRs**



According to (31) Pedro is (at least) as tall as Juan. This is the right interpretation, since (27) is compatible with both weak and strong interpretations (just like other equatives). In addition, notice that (31) does not entail that Juan is tall, only that Juan has some height. This is correct: even if both Juan and Pedro were 5 feet tall—a rather low height—, one could truthfully utter (27).

**5.3.2 Propositional DNRs**

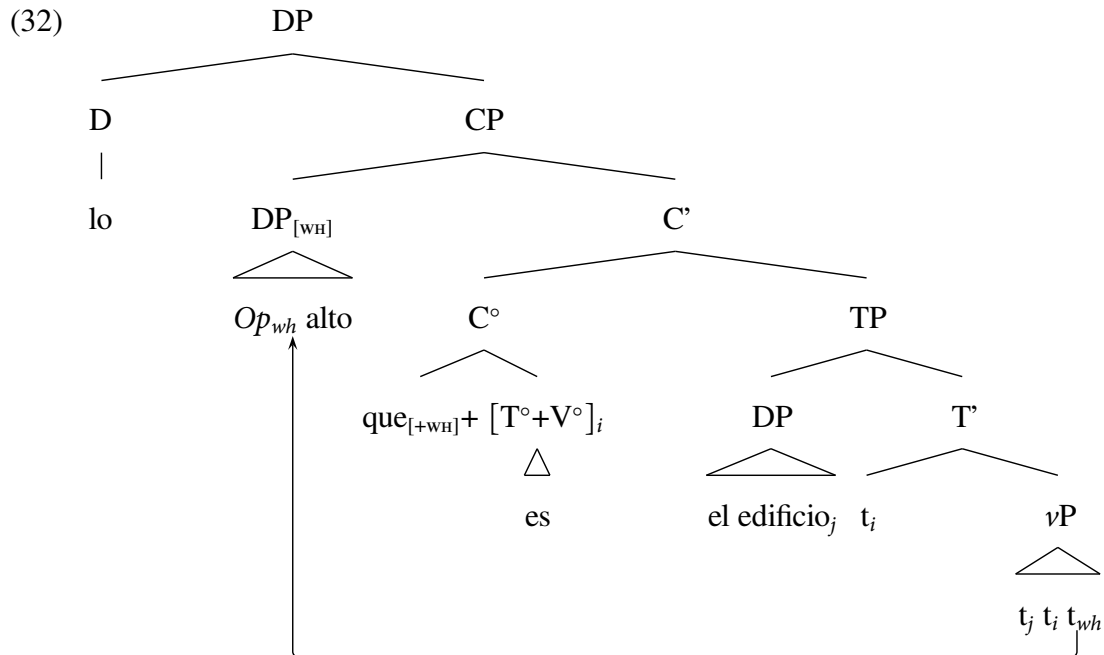
Analogously, propositional DNRs can be given an analysis along the same lines as propositional ARs. Consider the sentence (14b) again:

(14b) Yo sé lo alto que es el edificio.

I know LO tall that is the building

‘I know how tall the building is’

The syntactic structure that I propose for the DNR *lo alto que es el edificio* is the following.



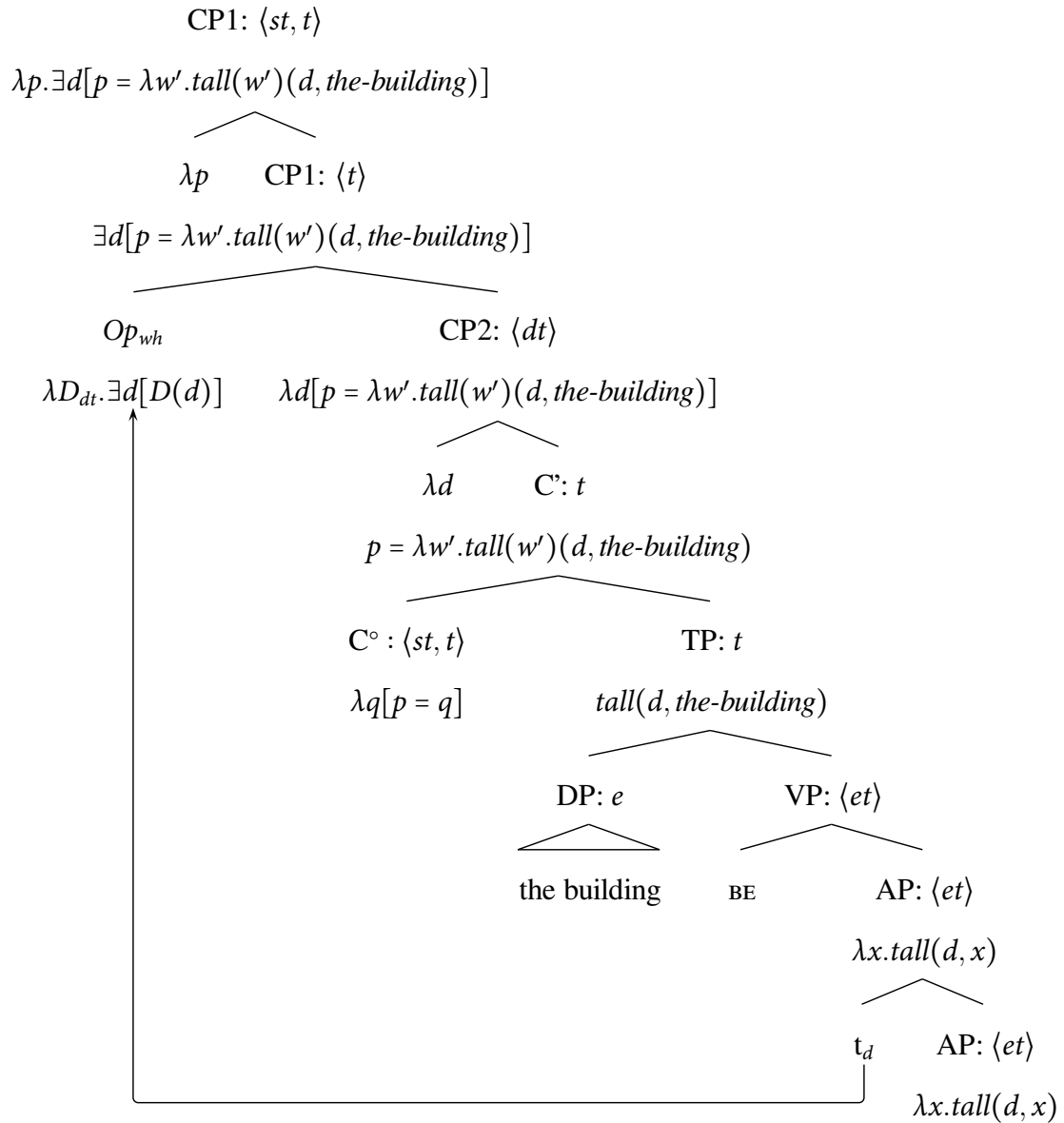
The syntactic structure is identical to subordinate degree questions formed with overt *wh*-pronouns. That is, both (14b) and (14a) share the same structure up to the CP level.

(14a) Yo sé cuán alto es el edificio.

I know how tall is the building

Intuitively, the semantic interpretation of both (14a)/(14b) can be paraphrased as: *I know for what degree d, the height of the building is d.* Following the same proposal discussed extensively in §4.3.2 of Chapter 4, the interpretation of the CP in (32) proceeds as follows.

(33) Interpretation of propositional DNRs



The meaning obtained in (33) is the set of propositions of the form *the building is d-high*. These, of course, are many degrees. We have to weed out the propositions that are neither true nor maximally informative. This is the task for  $D_{ANS}$ , the variant of the definite article modeled after Heim's (1994) and Dayal's (1996) answerhood operator introduced in §4.3.2.1.

$$(34) \quad \llbracket \mathbf{D}_{\text{ANS}} \rrbracket = \lambda Q_{(st,t)} . \lambda w : \exists p [Q(p) \wedge p(w) \wedge \forall q [[q(w) \wedge Q(q)] \rightarrow p \subseteq q]] \\ \cdot \iota p [Q(p) \wedge p(w) \wedge \forall q [[q(w) \wedge Q(q)] \rightarrow p \subseteq q]]$$

Applied to (33), the definite article  $\mathbf{D}_{\text{ANS}}$  takes a CP denoting a set of propositions—the CP1 in (33)—and returns the maximally informative proposition from that set.

$$(35) \quad \llbracket \mathbf{DP} \rrbracket = \llbracket \text{lo} \rrbracket (\llbracket \mathbf{CP1} \rrbracket) = \lambda w . \iota p [\llbracket \mathbf{CP1} \rrbracket (p) \wedge p(w) \wedge \forall q [[q(w) \wedge \llbracket \mathbf{CP1} \rrbracket (q)] \rightarrow p \subseteq q]]$$

This proposition now picks the only degree  $d$  such that the building is  $d$ -high in the evaluation world and entails all other propositions with a degree  $d'$  such that the building is also  $d'$ -high in the evaluation world.<sup>5</sup>

The semantics provided here is in accordance to our intuitions. I have not commented on two aspects of propositional DNRs: their interpretation under exclamative embedding predicates, and how to fix their denotation so that it can be taken as complements by predicates selecting for sets of propositions (e.g. rogative predicates like *ask* and *wonder*). These two issues are discussed in §4.3.2.2 and, since every aspect of the proposal presented there can be maintained as is, I will not repeat them here.

## 5.4 Conclusion

In this chapter, I discussed an unusual type of degree-related relative clause construction in Spanish and argued that they should be thought of as a subspecies of ARs. Like the more familiar ARs discussed in Chapters 3 and 4, DNRs were shown to come in two varieties,

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<sup>5</sup>Recall that the change from maximality (e.g. Rullmann 1995) to maximal informativity (Beck and Rullmann 1999, Abrusán 2014 a.o.) is necessary for examples with upward entailing predicates.

- (i) Bill knows...
  - a. ...how tall you have to be in order to get on the roller coaster.
  - b. ...how fast you are not allowed to drive on this road.

None of the subordinate questions above require a maximal degree, but a minimal one: if you are not allowed to drive at 80mph, then it is most likely that you are not allowed to drive at 81mph, or at 82mph, and so on. Thus, there is no maximal degree to which you are not allowed to drive. Of course, similar examples can be constructed with propositional DNRs.

predicational DNRs, which received a similar analysis as nominal ARs, and propositional DNRs, which were given the same treatment as propositional ARs.

Thinking of DNRs in this way accounts for many of their syntactic properties. First, the fact that they can only surface with *lo* is unsurprising if they are also ARs, which uniformly require the definite article. On this analysis the superficial “head” of the relative clause is in fact a displaced phrase embedded within a complex *wh*-phrase, which explains both the agreement paradigm as well as the syntactic flexibility. The neuter article is uniformly required because the underlying fronted DP is degree-denoting (not a nominal) and as such, it does not constitute a goal for D. The syntactic flexibility reflects the flexibility in *wh*-question formation: if a given category can be moved as part of an interrogative *wh*-phrase, it can be expected to be able to form DNRs (modulo orthogonal semantic considerations).

The resulting general state of affairs is one where DNRs, like ARs, require a covert *wh*-operator and *lo* which, on the surface, resembles a definite article and semantically conveys definiteness. Unlike ARs, however, the gradable predicate introducing the measuring function is overt. From a syntactic point of view, both ARs and DNRs make use of the same flexibility of the definite article and *lo*, either to combine with clausal CPs—in propositional ARs/DNRs—or to overtly show in free relatives—as in nominal ARs and predicative DNRs.



## CHAPTER 6

### CONCLUSION

This dissertation argues that languages arrive at AMOUNT interpretations of relative clauses in at least two, fundamentally different ways. Amount Relatives, understood as constructions involving syntactic and interpretive means ear-marked for constructing degree or amount expressions, exist in languages like Spanish. However, the term “Amount Relative” can be a misnomer for languages such as English, where relative clauses receiving AMOUNT interpretations constitute a subtype of more general kind-referring relative clauses—at least the ones discussed in this work. This is not to say that English lacks relative clauses with AMOUNT interpretations, but that they should not be analyzed as appealing to degree semantics.

#### 6.1 Summary

The second chapter offers a new perspective on AMOUNT interpretations of relative clauses in English that does not appeal to degree semantics. Taking seriously the commonalities between AMOUNT and KIND interpretations and the lack of evidence for degree abstraction in so-called English ARs, I proposed that they are all in fact KIND interpretations, where the particular subkind referenced are entities that are of a certain quantity or amount.

The third chapter looks into nominal ARs in Spanish, AR that appear as complements to predicates that take nominal arguments. It argues that ARs constitute relative clauses that denote maximalized sets of degrees, formally very close to *cuanto* (“how many”) free relatives. The maximalized degrees serve the role of a Measure Phrase, in turn allowing reference to particular degrees/amounts.

In the fourth chapter I argue that when Spanish ARs appear as complement to *wh*-embedding predicates they have the properties of subordinate questions and exclamatives. The chapter develops an analysis of this type of ARs, which I dubbed propositional ARs, where their “hybrid” nature is explained: their *wh*-like properties come from the fact that they involve an interrogative  $C^\circ$  and movement of a quantity *wh*-phrase, but their superficial DP-like appearance comes from the fact that the definite article involved is akin to an Answerhood operator and can therefore apply to sets of propositions. The syntactic structure required to obtain this result is moreover very similar to that of nominal ARs, differing only in the specification of the  $C^\circ$  head.

The fifth and last chapter extends the analyses of the previous two chapters to Degree Neuter Relatives, which I argued are a kind of AR. As ARs, Degree Neuter Relatives come in two varieties that differ exactly in the ways that propositional and nominal ARs are different, and so the analyses of nominal and propositional ARs presented above can be applied wholesale.

A comparison of the two languages shed light on the pieces required to form “genuine” ARs and potential sources of variability in the availability and distribution of relatives with AMOUNT interpretations. Spanish, for instance, has both overt and covert variants of the quantity *wh*-expression *how many*, which, moreover, can be used to form free relatives. These properties, in addition to the fact that Spanish possesses a flexible definite article that can apply to propositional objects, accounts for the distribution of ARs in the language. None of these pieces are available in English, and if this analysis is on the right track, ARs are predicted to be unavailable in English. I have argued that this prediction, in the strict sense, is borne out. English relative clauses with AMOUNT interpretations are a different species altogether and, unsurprisingly, do not share the same distribution and availability of Spanish ARs.

## 6.2 Open questions & future work

### 6.2.1 Amount Relatives across languages

This dissertation is focused on a very specific type of relative clause—relative clauses that permit AMOUNT interpretations—and argues that even within this narrow class, we find heterogeneity when we look at different languages. One of the goals of this dissertation was to understand this variation in terms of the syntactic and interpretive tools independently made available in a given language. But a more in-depth cross-linguistic examination of ARs is needed. Future work might focus on closely inspecting a broader group of languages within the Romance and Germanic language families. More interestingly, perhaps, an examination of languages without degree morphology might shed light on the various ways that a language might extract quantity-oriented interpretations without direct appeal to quantity-denoting elements.

### 6.2.2 The nature of degrees

ARs are, on the face of it, constructions that describe amounts, quantities or degrees. As such, one hope is that analyzing these constructions also bear on our understanding of degrees. In this dissertation, I have referred to degrees in two ways. In Chapter 2 I used a conception of degrees where they can be referenced as equivalence classes of individuals, i.e. as sets of individuals that have the same measure along some dimension (height, size, spiciness, etc.). Chapters 4, 3 and 5, however, make use of the standard view that degrees are atomic types, i.e. they are points on a scale abstractly representing some measurement.<sup>1</sup> An obvious question arises: how are these two notions of degrees related? Could there be “one degree to rule them all”?

My answer to the question depends on what counts as a degree. In some ways, the equivalence-class view is not, strictly speaking, a degree-based theory: degrees are just names

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<sup>1</sup>A popular alternative is to represent degrees as intervals on a scale; for the purposes of this discussion, I will treat it together with the view of degrees as atomic types.

for certain kinds of sets, a handy shortcut. If my approach to English ARs is on the right track, this approach to degrees is empirically necessary. Moreover, it 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. On the other hand, there are 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 including degrees in our ontology seem well grounded. Now, if equivalence classes do not count towards the tally of degree theories, there is no reason to choose between the two. We can have a single theory of degree semantics while still maintaining that degrees *can* be represented as equivalence classes. One contribution of this dissertation to our understanding of degrees is showing that this mode of representing degrees is better suited for certain tasks than degree semantics proper. This result suggests that we need to have both notions of degrees in our semantic toolbox.

The explanandum on such a view, however, is to understand how simplex degrees and their complex, equivalence class counterparts are related. In my view, this question is a restatement of the old problem that degrees should include information about the objects they are measuring. That is, the way we use degree expressions in natural languages, degrees are always degrees of something, and oftentimes we require that information in order to write their proper interpretation in our metalanguage. The way degree theories are built, however, the type of *d* of degrees is opaque and this information is rendered inaccessible (with the notable exception of Grosu and Landman 1998). But in a world where we have both, atomic degrees and the ability of representing them as equivalence classes, there must 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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