

Degree Modification in Natural Language

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Language is my mother, my father, my husband, my brother, my sister, my whore, my mistress, my checkout girl. Language is a complimentary moist lemon-scented cleansing square or handy freshen-up wipette. Language is the breath of God. Language is the dew on a fresh apple. [...] Language is the creak on a stair; it's a spluttering match held to a frosted pane; it's a half-remembered childhood birthday party; it's the warm, wet, trusting touch of a leaking nappy; the hulk of a charred panzer; the underside of a granite boulder; the first downy growth on the upper lip of a Mediterranean girl; it's cobwebs long since overrun by an old Wellington boot.

–Stephen Fry, *A Bit of Fry and Laurie*

This dissertation is a study of the roles played by degree modifiers – functions from sets of degrees to sets of degrees – across different constructions and languages. The immediate goal of such a project is a better understanding of the distribution of these morphemes and how they contribute to the meaning of an expression. More broadly, a study of the semantics of degree modifiers is of interest because it helps demonstrate parallels between the degree and individual domains.

Chapter 1 introduces the assumptions made and practices followed in the dissertation. Chapter 2 presents a first study of degree modification: ‘*m*-words,’ a term I use to refer to *many, much, few, little*, and their cross-linguistic counterparts. I argue that they are functions from a set of degrees to its measure. This characterization is based on accounts of *m*-words as differentials in comparatives; I extend it to other occurrences of *m*-words, e.g. as they occur pre-nominally and in quantity questions in Balkan languages.

Chapter 3 broadens the study of degree modifiers to the semantic property ‘evaluativity’. A construction is evaluative if it refers to a degree that exceeds a standard, as in *John is tall*. I argue that evaluativity is encoded in the null degree modifier ‘EVAL,’ a function from a set of degrees to those which exceed a contextually-valued standard. Evidence for this approach is the occurrence of

evaluativity in expressions with and without degree quantifiers (pace 'POS' approaches). I extend the account to a wide variety of evaluative and non-evaluative constructions.

Chapter 4 begins as an extension of Chapter 3: it is a study of exclamatives (like *Boy, how very tall John is!*), which seem to be evaluative. Addressing this issue, I argue, requires characterizing the content of exclamatives as degree properties. In the end, such an account suggests that the scope of degree modification extends beyond canonical degree constructions.

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CHAPTER 1

Introduction

The goal of this dissertation is to argue that many puzzles in degree semantics can be solved by assuming that natural language employs degree modifiers. Degree modifiers, parallel to their counterparts in the individual domain, are functions from a set of degrees to a set of degrees (type $\langle\langle d, t \rangle, \langle d, t \rangle\rangle$). They have a relatively free distribution because 1) their characterization is semantic: they can modify any type of syntactic category, as long as its value is a set of degrees. And 2) they do not alter the semantic type of the derivation in which they occur, so they are in principle optional in any expression in which they can occur.

1.1 Theoretical background

Immediately below, I provide a brief background of degree semantics and make explicit my assumptions about degrees. The final subsection discusses degrees in the context of cross-domain semantics.

1.1.1 Degrees and degree semantics

In Cresswell (1973), the author presents a logic for natural language in which predicates like *red* and *winning* are individual modifiers: functions from a set of individuals (say, strategies) to a subset of those individuals (winning strategies). Cresswell (1976) modifies this approach for the purposes of treating predicates like *tall*. He observes:

We suppose that in phrases like:

- (1) a. a tall man
- b. a very tall man
- c. a much too tall man
- d. a taller man

the underlying semantic concept is x -**much tall man**, where x is a degree of tallness. [...] On this analysis $\langle \text{tall}, \text{man} \rangle$ becomes in effect a two-place predicate with (roughly) the meaning of x **is a man who is tall to degree y** (p. 266).

Cresswell thus assigns these gradable adjectives like *tall* type $\langle e, \langle e, t \rangle \rangle$ (in attributive position; $\langle \langle e, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle$ in predicative position). He constrains the internal individual argument ($'a'$) so that it corresponds to a physical object, and he constrains the external individual argument ($'b'$) as follows:

$b = \langle u, > \rangle$, where $>$ is the relation whose field is the set of all v such that v is a spatial distance, and $\langle v_1, v_2 \rangle \in >$ iff v_1 is a greater distance than v_2 , and u is the distance between a 's extremities in w , and in the case of most [individuals]... this distance will typically be vertical (p. 267).

The approach to degrees adopted in this dissertation is a straightforward adaptation of the Cresswell approach (and its predecessors in Bartsch and Vennemann, 1972; Seuren, 1973). Specifically, I assume:

- Gradable adjectives are type $\langle e, \langle d, t \rangle \rangle$, functions from individuals to sets of degrees (sets of degrees are also called ‘scales’) (Seuren, 1984; Cresswell, 1976; Hellan, 1981; Hoeksema, 1983; von Stechow, 1984a; Heim, 1985; Gawron, 1995; Rullman, 1995; Izvorski, 1995; Heim, 2000a, among others).
- Scales are triples $\langle D, <_{\mathcal{R}}, \psi \rangle$ with D a set of points, $>_{\mathcal{R}}$ a total ordering on D , and ψ a dimension (e.g. ‘height’) (Bartsch and Vennemann, 1972; Bierwisch, 1989).
- Degrees d are therefore shorthand for triples $\langle d, <_{\mathcal{R}}, \psi \rangle$ with d a point on a scale D , $>_{\mathcal{R}}$ a total ordering on D , and ψ a dimension.

Vague predicate accounts

The primary alternative to ‘degree accounts’ of the semantics of gradable adjectives like the one outlined above are accounts which exclude degrees from the ontology (McConnell-Ginet, 1973; Kamp, 1975; Fine, 1975; Klein, 1980, 1982; van Benthem, 1983; Larson, 1988; Neeleman et al., 2004). In these accounts, the gradable predicates referred to above are instead called vague predicates: rather than a function from individuals to sets of degrees, a predicate like *tall* is analyzed as a partial function from individuals to truth values.

Take a model M with a universe $U_M = \{\text{Alons, Benoit, Claude}\}$ in which Alons is definitely tall, Claude is definitely not tall, but Benoit is neither definitely tall nor *not* definitely not tall. F_{tall} will map Alons to the positive extension of *tall* (the value ‘true’), Claude to the negative extension of *tall* (the value ‘false’), but $F_{tall}(\text{benoit})$ is undefined. Klein assumes that what constitutes the positive and negative extensions and the extension gap of a predicate is a function of the context of utterance. This accounts for the intuition that Alons’ being considered tall in M doesn’t necessarily mean he will be considered tall in a different model M' .

The vague predicate account has been extended to treat the semantics of other kinds of ‘degree’ constructions (most notably the comparative). But Kennedy (1999b, 2001) argues that it has important empirical limitations. One example of these limitations is indirect comparatives (“Comparisons of Deviation” in Kennedy’s terminology), which are discussed at length in Chapter 3, Section 3.5.4.¹

(2) That dinner was more expensive than it was tasty.

(2) intuitively means that the extent to which the cost of the dinner exceeded a threshold of dinner pricing is greater than the extent to which the tastiness of the dinner exceeded a threshold of dinner tastiness. It is hard to see how an account of gradable adjectives and comparatives which relies on the partitioning of individuals rather than on degrees can capture such an interpretation.

Interval semantic accounts

The use of adjectival scales and degrees outlined above has been recently modified in accounts which argue that gradable predicates “have a semantics based on intervals, not points” (Schwarzschild and Wilkinson, 2002, 1). An interval-semantic treatment of what I’ve been referring to as degree constructions (e.g. the comparative) parallels a similar move from points of time to intervals of time in the tense literature (Bennett and Partee, 1972; Bennett, 1977; Cresswell, 1985, from Schwarzschild & Wilkinson 2002).

Instead of analyzing gradable adjectives as taking a degree argument, this account analyzes them as taking interval arguments (and e.g. the comparative as being a relation between intervals, loosely speaking). Schwarzschild and Wilkinson’s

¹In these papers, Kennedy advocates a third treatment of gradable adjectives, in which they are ‘measure functions’ from individuals to degrees (type $\langle e, d \rangle$). I have no empirical reason to reject this analysis, and Kennedy (2007) acknowledges that they can be viewed as notational variants of one another. However, the discussion in Section 1.1.3 suggests that the measure function analysis of gradable adjectives is less attractive than the degree account above by virtue of the fact that it is less conducive to a broad parallel between the individual and degree domains.

arguments for this approach come from the semantic behavior of quantifiers in the complement clauses of comparatives. Heim’s (2006) account of the same behavior – which instead uses degrees as primitives – suggests that the two approaches are variants of one another.

1.1.2 Technical matter

Throughout the dissertation, I adopt certain formal practices:

- Words in *italics* are in the object language, words in sans serif are in the meta-language
- The following variables range over the following types of entities:

x, y	individuals	$\langle e \rangle$
X, Y	plural individuals	$\langle e \rangle$
P, Q	sets of individuals	$\langle e, t \rangle$
\mathcal{P}, \mathcal{Q}	individual properties	$\langle e, \langle s, t \rangle \rangle$
d, d''	degrees	$\langle d \rangle$
D, D'	sets of degrees	$\langle d, t \rangle$
$\mathcal{D}, \mathcal{D}'$	degree properties	$\langle d, \langle s, t \rangle \rangle$
w, w'	worlds	$\langle s \rangle$

- I represent moved items in syntactic constructions as follows: a trace t is subscripted with a variable corresponding to the type of the trace. (For instance, if the trace has the semantic value x , it is written as ' t_x '.) The moved element is superscripted with this same variable (e.g. ' $what^{t_x}$ ').
- I assume following Heim (1982) and Partee (1987), among others, that existential closure is generally available at the end of utterances. I consider existential closure to be an implicit unselective binder \exists on free variables in its scope. It is one way – but admittedly not the only way – to reconcile differences between expressions which appear to have quantification encoded in a linguistic expression and those which do not.

1.1.3 Cross-domain parallels

There is a long tradition in semantics of generalizing across domains as well as across languages.² Barbara Partee’s work compared individuals and times (Partee, 1973, 1984). This work was extended to a more general cross-domain approach which includes individuals (Partee, 1987) and has been revived in recent work (e.g. Stone 1997 and Keshet *to appear*). Additional work has demonstrated parallels between events and individuals based on the apparent ability of some verbs (pluractionals) and adverbials (reciprocals) to range over both (Laserson, 1995; Schein, 2003). General traits of these domains have recently been described and compared in Schlenker (2006).

It is traditionally assumed in linguistics that a theory which can capture similarities across languages is preferred over one which analyzes them as accidental, *ceteris paribus*. I follow this assumption below, for instance, when I use data involving the Romanian *mult* to argue for a particular characterization of the English *many*. It seems to me, in light of the observed cross-domain similarities mentioned above, a similar cross-domain assumption should guide semantic theory. Specifically, a theory which can capture similarities across domains is preferred over one which analyzes them as accidental, *ceteris paribus*.

The table below illustrates some similarities in types of morphemes across the individual and degree domains, given the degree account assumed above.

TABLE 1.1 *A comparison of terms in the individual and degree domains*

<i>type</i>	<i>term</i>	INDIVIDUALS	DEGREES
$\langle \sigma \rangle$	names	<i>John</i>	<i>6ft</i>
$\langle \sigma, \langle s, t \rangle \rangle$	properties	<i>walking</i>	<i>how tall John is</i>
$\langle \langle \sigma, t \rangle, \langle \sigma, t \rangle \rangle$	modifiers	<i>winning (strategy)</i>	<i>much (taller)</i> ☆
$\langle \langle \sigma, t \rangle, \langle \langle \sigma, t \rangle, t \rangle \rangle$	quantifiers	<i>all</i>	<i>more</i>

²In the syntactic literature, a parallel is cross-categorical comparison. See Corver (2000), which is particularly relevant to the topics in this dissertation, and also Baker (2003) for a comprehensive discussion of the notion of category in syntax.

There has been a lot of focus on degree quantifiers in the literature (Doetjes, 1997; Heim, 2006; Bhatt and Pancheva, 2004, to name some recent ones). The star ☆ marks the type of term that this dissertation is concerned with, degree modifiers.

To my knowledge, the first use of this sense of the term ‘degree modifiers’ is in Paradis (1997). Paradis uses the term to subsume several different categories to which modifiers of adjectives and verbs had previously been assigned (see Table 1.2, reproduced from Paradis 1997, 14).

TABLE 1.2 *Types of terms subsumed under Paradis’ notion of ‘degree modifier’*

Source	Modifier of adjectives	Modifier of verbs
Halliday (1985)	submodifier	mood adjunct
Quirk et al. (1985)	modifier	subjunct
Allerton (1987)	intensifier	adverb of degree
Collins (1990)	submodifier	adverb of degree

She defines a degree modifier as “any element which modifies another element with respect to degree” (p. 19), but restricts her study to only those which occur before adjectives (e.g. *completely, quite, really, extremely*, etc.). This dissertation extends Paradis’ discussion by contributing a formal characterization of degree modifiers and extending the concept of degree modification outside of the preadjectival position. (See Kennedy and McNally, 2005, for a recent analysis of the words discussed by Paradis).

1.2 Outline

1.2.1 Chapter 2

Chapter 2 provides a first look at degree modifiers by examining the meaning and distribution of what I refer to as ‘*m*-words’: English *many, much, few* and *little* and their counterparts in other languages. *M*-words have a relatively wide distribution; they occur with NPs (as in *much cheese*); PPs (*much over the speed limit*) and

comparative clauses (*much taller than Adam*). Some have additionally argued that *m*-words contribute their meaning to the *wh*-phrases *how many/much/etc.* as well as to the comparative words *more/fewer/etc.*

Roughly each context in which *m*-words occur has inspired a different characterization of their meaning. They have been analyzed as generalized quantifiers (like *all*), gradable predicates (like *tall*), a special sort of determiner which additionally takes a degree argument, and a predicate of scalar intervals (a differential, like the measure phrase *2ft* in *A is 2ft taller than B*). Given that the roles listed in the preceding paragraph are performed by homophonous words not just in English but in many other languages, it would be ideal to have a semantics of *m*-words which is unified across these constructions. Given the value of cross-domain parallels discussed in the previous section, an account of *m*-words should also not assign them a type unique to the degree domain.

In this chapter I propose a unified semantics for *m*-words as they occur across constructions. I characterize *m*-words as degree modifiers, an account which is based on analyses of *m*-words in differentials (Wheeler, 1972; McConnell-Ginet, 1973; Klein, 1982). In my proposal, an *m*-word is a function from a set of degrees to a (singleton) set of degrees that is its measure. That the range of an *m*-word is a set of degrees *d* means that it can serve as an argument for e.g. *too* in *too much cake*. In the absence of morphemes like *too*, I assume that the range of an *m*-word is bound via existential closure.

This chapter provides two types of arguments for this characterization of *m*-words: arguments against approaches which characterize *m*-words as contributing individual quantification $\exists x$, and arguments in favor of a characterization of *m*-words as degree modifiers. The former are presented in the context of theories which analyze *wh*-phrases like *how many* as being composed semantically of *how* and *many*. Such theories can't account for French split-NP constructions in the

French equivalents of *how many* questions or the fact that *m*-words are optional in the e.g. Romanian equivalent of *how many* questions.

The latter arguments (those for characterizing *m*-words as degree modifiers) stem from the semantic behavior of these Romanian questions (and similar constructions in other Balkan languages). Romanian equivalents of *how many* questions which contain an *m*-word differ in subtle semantic ways from Romanian equivalents of *how many* questions which do not contain an *m*-word. I show that these differences are accounted for given the characterization of *m*-words above, and extend the theory to *m*-words in other constructions and languages.

1.2.2 Chapter 3

Chapter 3 extends this knowledge of the nature of degree modifiers to a semantic property I refer to as 'evaluativity'. A construction is evaluative if it makes reference to a degree which exceeds a contextual standard. Evaluativity is most famously a property of the 'positive construction,' a type of expression which contains a gradable adjective but no (other) overt degree morphology. Thus *Adam is tall* means not that there is a degree to which Adam is tall but that there is a degree *exceeding the relevant standard of tallness* to which Adam is tall.

Previous theories of evaluativity have exploited the close connection between evaluativity and the positive construction, proposing that evaluativity (encoded in a null morpheme 'POS') can only occur in lieu of overt degree morphology (Bartsch and Vennemann, 1972; Cresswell, 1976; von Stechow, 1984a; Kennedy, 1999b). However, it is clear that this makes the wrong predictions about the distribution of evaluativity. The expression *Adam is as short as Doug*, for instance, means that there is a degree *exceeding the relevant standard of shortness* to which Adam and Doug are short. This is so despite the fact that the expression contains overt degree morphology (*as*). Therefore the distribution of evaluativity extends beyond

the positive construction.

I show that there are two factors which play a role in whether or not a construction is evaluative: 1) the polarity of its predicate (e.g. *tall* vs. *short*) and 2) whether it is polar-variant or polar-invariant, terms which are primarily descriptive but which I argue correspond to semantic properties of the degree quantifier in the construction.

This way of reconceptualizing evaluativity makes it possible to think of its distribution not in terms of where evaluativity *doesn't* occur but in terms of where it *does* occur. I characterize the null morpheme that encodes evaluativity ('EVAL') as a degree modifier, a function from a set D of degrees d to a subset of D containing only those degrees d which exceed a contextually-valued standard. The result is that evaluativity can in principle take any set of degrees as its argument and does so optionally. Because it is phonologically covert, this optionality translates into the prediction that any degree construction is in principle ambiguous between an evaluative and a non-evaluative interpretation.

The rest of the chapter explains how this analysis captures the apparent evaluative meanings of expressions like *Adam is tall* and *Adam is as short as Doug* as well as the apparent non-evaluative meanings of expressions like *Adam is shorter than Doug* and *How tall is Doug?*. I extend the account to differences in evaluativity between e.g. *Adam is shorter than Doug* (not evaluative; Adam need not be short) and *Adam is more short than Doug* (evaluative; Adam must be short) as well as to antonym pairs other than *tall* and *short*.

1.2.3 Chapter 4

Chapter 4 is in part another extension of the EVAL account: it is concerned with the (obligatory) evaluativity of exclamatives like *How short you are!*. However, an understanding of this instantiation of evaluativity requires a better understanding

of the speech act as a whole. I start by arguing that exclamatives – exclamations expressed with *wh*-clauses, nominals or inversion sentences – have in common two semantic restrictions (in contrast to ‘proposition exclamations’ like *Boy, you woke up at 8am!*). These restrictions are: 1) the Degree Restriction: the content of an exclamative can only be ‘about’ degrees in a particular way; and 2) the Evaluativity Restriction: the content of an exclamative must be evaluative.

I account for these differences by proposing that proposition exclamations and exclamatives, despite instantiating the same speech act, are uttered with two different illocutionary force operators, ‘Proposition E-FORCE’ and ‘Degree E-FORCE’. The former is a function from a proposition to an expression of surprise, while the latter is a function from a degree property to an expression of surprise.

The ramifications of this analysis are relevant to degree modification in a second way. The Degree E-FORCE proposal provides an explanation for which types of syntactic constructions can be used to express exclamatives: those constructions which can denote degree properties. However, the inclusion of inversion constructions – like the one used to express the exclamative *Boy, can Robin bake pies!* – in this category raises the question, “What does it mean to be a degree construction?”

The final chapter concludes by reviewing the claims made in the dissertation and their corresponding assumptions. It also speculates about the ramifications and possible extensions of the accounts presented here.

CHAPTER 2

M-words and Degree Modification

This chapter discusses the meaning of the English words *many*, *much*, *few* and *little* and their counterparts in other languages.¹ I refer to these words as ‘*m*-words’ to enable cross-linguistic comparison and to eliminate bias towards a particular syntactic or semantic characterization. There are roughly four characterizations of the meaning of *m*-words in the literature, each corresponding to a different context in which they can occur. Ideally, of course, we would attribute the same meaning to each instantiation of an *m*-word, regardless of the type of construction it appears in, skirting any issues of accidental homophony. This is the goal of this chapter.

I begin by reviewing current proposals of the meaning of *m*-words, many of which can account for *m*-words in some types of constructions but not in others. I’ll argue that the account of *m*-words based on their function as differentials in comparatives (e.g. *A is much taller than B*; Wheeler, 1972; McConnell-Ginet, 1973) is the only one which can extend to the occurrence of *m*-words in other constructions. In the degree modifier version of this approach, an *m*-word denotes a function from a set of degrees to a singleton set of the measure of that set. The commitment to this measure being large relative to a contextual standard (a commitment evident in the

¹This chapter is an expansion of work in Rett (2007).

truth conditions of *A is much taller than B*) is associated with a general phenomenon, the distribution of evaluativity (see Chapter 3 and Rett, 2008).

I show that this meaning can be extended to other instantiations of *m*-words in other types of constructions. A large focus of the chapter – and a source of evidence for the Degree Modifier Approach – is the matter of what semantic role *m*-words play in the meaning of the *wh*-phrases in quantity questions (e.g. those headed by *how many*, *how much*, *how few* and *how little* in English). These *wh*-phrases, like *m*-words, vary cross-linguistically in their semantic content and morphology, so I adopt the term ‘quantum phrases’ to refer to them generally.

While English quantum phrases are composed morphologically of a *wh*-phrase and an *m*-word, many languages have monomorphemic quantum phrases. A cross-linguistic and compositional semantics of quantum phrases, then, needs to address the question of whether or not the meaning of a quantum phrase includes in part the meaning of an *m*-word. To argue that it does is to remain true to English morphology and posit null *m*-words for quantum phrases in many other languages. To argue that it does not requires an independent explanation of the morphology of English quantum phrases. I argue that this last option is the correct one, by examining quantity questions in Balkan languages, in which an *m*-word can be optionally added to a quantum phrase in quantity questions (Rett, 2007).

2.1 Previous accounts of *m*-words

This section reviews four different proposals for the semantics of *m*-words based on four different syntactic contexts in which they occur. In this respect it is essentially a literature review which precedes the presentation of the analysis advocated here. These four proposals fit into two groups: those in which *m*-words contribute existential quantification over individuals (and are therefore similar to determin-

ers, ‘Degree Determiner Approaches’) and those which don’t (‘Degree Modifier Approaches’). The former are based on prenominal occurrences of *m*-words or the assumption that the meaning of comparatives like *more* and *fewer* is contributed in part by the meaning of *m*-words (e.g. Barwise and Cooper, 1981; Hackl, 2000, respectively). The latter are based on the occurrence of *m*-words in degree quantifier expressions (like *too much pizza*) or as differentials in comparatives (e.g. Hoeksema, 1983; McConnell-Ginet, 1973, respectively).

In Section 2.2, I argue against Degree Determiner Approaches by challenging the idea that phrases with morphological instantiations of *m*-words (like the comparative *more* and the quantum phrase *how many*) have semantic instantiations of *m*-words (have a meaning composed in part from the meaning of *m*-words). In Section 2.3, I argue for a Degree Modifier Approach to *m*-words by showing that quantity questions in Romanian (and other Balkan languages) differ from quantity questions in other languages (like English and French) in that they can optionally contain an *m*-word. This optionality provides additional evidence against Degree Determiner Approaches to *m*-words. I then show that the difference in meaning between Romanian quantity questions with and without *m*-words can be accounted for with a degree modifier analysis of *m*-words.

The rest of the chapter takes up the larger goal of using this characterization of *m*-words to account for the behavior and meaning of *m*-words in other constructions (e.g. as they occur prenominally).

2.1.1 *M*-words as quantificational determiners

The most common characterization of *m*-words is as determiners, on par with e.g. *all* and *some*. This comes from their prenominal distribution in sentences like (1).

- (1) a. All Midwesterners like cheese.
 b. Some Midwesterners like cheese.
 c. Many Midwesterners like cheese.

These sentences suggest that a semantic analysis of *m*-words would fall in nicely with a semantics of generalized quantifiers. Such an analysis found in Barwise and Cooper (1981) and Keenan (1996). (2) shows a simplification of the meaning of these determiners advocated in Generalized Quantifier Theory. Hackl (2000) provides an extensive summary and review of this approach.

- (2) a. $\llbracket all \rrbracket = \lambda P \lambda Q. P \subset Q$
 b. $\llbracket some \rrbracket = \lambda P \lambda Q. P \cap Q \neq \emptyset$
 c. $\llbracket many \rrbracket = \lambda P \lambda Q. |P \cap Q| \geq d, d \text{ a large number.}$

There are a few (important) ways in which *m*-words differ from other generalized quantifiers, however, making this parallel less attractive than it might otherwise be. First, *m*-words (and other degree words like *more* and *most*) are untreatable in a first-order logic, requiring a function which introduces a degree *d* (in the case above, the cardinality function $| \cdot |$). They are additionally context-sensitive in the sense that the restriction on *d* – that it be large – varies across contexts of utterances.

Another complication, discussed at length in Milsark (1977); Partee (1989); Westerstahl (1985), is that *m*-words seem to be ambiguous between a cardinality reading and a proportional reading. This is demonstrated in (3) and (4), where *linguists* denotes the set of linguists, and *women* the set of women.

- (3) Many linguists are women. (*cardinal reading*)
 $| \text{linguists} \cap \text{women} | \geq d$
- (4) Many linguists are women. (*proportional reading*)
 $\frac{| \text{linguists} \cap \text{women} |}{| \text{linguists} |} \geq k, k \text{ a fraction or percentage}$

In (3), the amount of female linguists is understood to be large, generally, in a given context. In (4), the amount of female linguists is large relative to other sorts of linguists. Partee (1989) likens the proportional reading to a partitive one, as in

the sentence *Many of the linguists are women*. She accounts for this difference in terms of the nature of the existential commitments of these forms. It is not clear how to build this potential ambiguity into the meaning of *many* in (2c). (See Hackl, 2000, for an in-depth discussion of the difference between cardinal and proportional quantifiers and the complications raised for GQT by the latter).

A final complication to an analysis which treats *m*-words as generalized quantifiers comes from the fact that *m*-words (unlike e.g. *all*) can occur with determiners.

- (5) a. The many guests brought gifts.
- b. These few students have managed to excel in the class.

There is an interesting qualification: *m*-words can only occur with definite determiners.

- (6) a. *Several many guests brought gifts.
- b. *All many guests brought gifts.
- c. *Some many guests brought gifts.

A quantificational determiner account of *m*-words needs to account for the fact that they *can* occur with definite determiners. An account of *m*-words which classifies them as something other than determiners, on the other hand, must account for why they *cannot* occur with non-definite determiners.

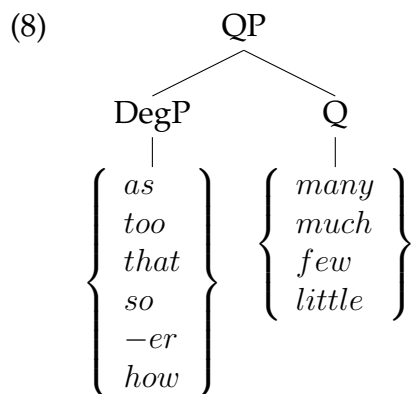
In addition to these complications, it is unclear how to extend this characterization of *m*-words to their occurrences in a variety of other contexts. The next subsection presents a second account of the semantics of *m*-words based on the fact that they appear to pattern in many ways with gradable predicates.

2.1.2 *M*-words as gradable predicates

In her 1973 article, Bresnan examines the distribution of degree words like the equative *as* and the comparative *-er*. She observes the following triplets:

	as many people	as few people	as intelligent
	too many people	too few people	too intelligent
(7)	that many people	that few people	that intelligent
	so many people	so few people	so intelligent
	how many people	how few people	how intelligent
	more people	fewer people	more intelligent

She infers from the first five rows that prenominal quantifier phrases have two distinct components: a ‘determiner’ (*as, too, etc.*) and a ‘quantifier,’ its head (*many, much, etc.*). Words are assigned to these categories based on their syntactic positions. Bresnan’s theory is referred to by Corver (1997) as the ‘split-degree hypothesis’ (in contrast to a competing theory in Jackendoff, 1977), and is depicted below:



The morphology of the comparative *fewer people* indicates that a comparative is formed from right-affixation of the determiner *-er* to an *m*-word. We can assume the same for other comparatives like *more people* and *more intelligent* if we consider *more* to be a suppletive result of the determiner *-er* right-affixing to the *m*-words *many* or *much*. Thus, the theory that degree constructions involve both a determiner and a quantifier generalizes to comparatives (the final row in (7)): comparative phrases, like e.g. equatives, contain a determiner *-er* and a quantifier (an *m*-word); they differ in that these two syntactic categories are manifested in one word.

This descriptive account allows for an assimilation of *more people* (*more* + NP) and *more intelligent* (*more* + AP); in both cases, *-er* affixes to an *m*-word which itself

takes either an NP or an AP as its complement. But this theory takes for granted that *m*-words can take APs as complements in the first place. This does not seem to be the case.

- (9) a. Joe is (*much) tall.
b. Joe is as (*much) tall as Sue.

To reconcile her account with (9), Bresnan proposes a surface-structure deletion rule which stipulates that *m*-words must delete in surface structure when it linearly precedes an adjective. This final aspect of Bresnan's proposal is generally recognized as unattractive, and has led many to rethink the syntax of the constructions in (7) (Jackendoff, 1977; Corver, 1997).

Bresnan's general suggestion, however – that *m*-words play a role in degree quantification – has been widely adopted into modern analyses of degree constructions. What's interesting is that her discussion of *m*-words is based entirely on morphosyntactic observations, from which she drew entirely morphosyntactic conclusions. But many accounts of the meaning of degree constructions have interpreted Bresnan's claim as a *semantic* one.

This has led to analyses of *m*-words as gradable predicates, as the split-degree hypothesis posits that *m*-words (like gradable predicates) occur between determiners and nouns. In semantic adaptations of Bresnan's proposal, like Hoeksema (1983) and Grosu and Landman (1998), prenominal *m*-words are treated on par with gradable adjectives like *tall*: they denote relations between individuals and degrees. In defending the view that *m*-words should be analyzed as predicates, Hoeksema argues: "... they form comparatives and superlatives, they can be modified by degree expressions like *too* or *very* and may take part in the construction *as ADJ as (as big as, as many as)*. ... *Many* and *few* can also be used in predicative position (*his sins were many, his virtues were few*)" (p. 65).

Such an account is compatible with the following characterization, which parallels the semantics of gradable adjectives like *tall* (as outlined in Chapter 1).

- (10) a. $\llbracket tall \rrbracket = \lambda x \lambda d. tall(x, d)$
 b. $\llbracket many \rrbracket = \lambda X \lambda d. many(X, d)$

In these accounts, *m*-words denote two-place relations between individual pluralities *X* and degrees *d* corresponding to the number of entities in *X*.

Due to Bresnan’s generalizations about the morphosyntactic distribution of *m*-words and Hoeksema’s observations about the semantic parallels between *m*-words and gradable predicates, the definition in (10b) has been adopted more or less alongside the ‘*m*-words-as-determiners’ thesis advocated in GQT. Clearly, this is less optimal than a single, unified account for *m*-words.

The relative efficacy of both the determiner and gradable predicate characterizations of *m*-words has led some to posit a ‘hybrid’ account, which essentially has the best of both worlds. This account, presented below, stems from the alleged distribution of *m*-words in the comparative *more*. It is this account which will be challenged in the upcoming sections.

2.1.3 *M*-words in *more*

Hackl (2000), too, infers from Bresnan’s claim that *more* is composed morphologically of an *m*-word and *-er* to the claim that *more* is composed semantically of an *m*-word and *-er*. He then reasons from the meaning of comparative clauses in a particular type of construction – those involving ‘Minimal Number Predicates’ (MNPs) – to the meaning of *m*-words.

Hackl analyzes *m*-words as what he refers to as ‘comparative determiners,’ type $\langle d, \langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle \rangle$. As he notes, a comparative determiner is a ‘hybrid’ between a generalized quantifier (because it takes two predicate arguments, corresponding to NP and VP) and a gradable predicate (because it also takes a degree argument,

corresponding to the size of an individual). His formalization of *m*-words is below.²

$$(11) \quad \llbracket many \rrbracket = \lambda d \lambda P \lambda Q \exists x [|x| = d \wedge P(x) \wedge Q(x)]$$

There are several accounts predating Hackl's which have assigned this same meaning to *m*-words (Heycock, 1995; Romero, 1998). In these accounts, the analysis is based instead on the presumed role of *m*-words in quantity questions headed by e.g. *how much*. I will motivate this meaning of *m*-words using Hackl's exposition, because it is the most explicit. Section 2.2 shows how this conceptualization of *m*-words has been used to account for the semantics of quantity questions.

Hackl's empirical concern are minimal number predicates ('MNPs') like *are meeting* and how they behave in comparatives like (12).

- (12) a. *More than one student is meeting.
b. At least two students are meeting.

The forms in (12) differ in acceptability despite the fact that they allegedly have the same truth conditions: *More than one student VPs* is true if two or more students VP, and these are the same conditions under which *At least two students VP* is true. Given this synonymy, it is tempting to suggest that the difference in acceptability between (12a) and (12b) is the result of some syntactic difference, perhaps the difference in number agreement between the two forms (Winter, 1998). But Hackl argues that this cannot be the case.

First: the same ungrammaticality contrasts in (12) show up in positions other than the subject position (positions with which English verbs do not agree; these examples are his, p. 39).

- (13) a. ??John separated more than one animal.
b. John separated at least two animals.

²The meaning of *many* initially proposed by Hackl (p. 56) does not involve an existential quantifier in the version cited here, but he uses this alternate characterization later in the text (p. 167).

A second argument against an agreement-driven account of the differences in (12) is that these effects persist for predicates which require 3 rather than 2 participants, where the effect of plurality is neutralized (*ibidem*).

- (14) a. ??More than two students dispersed/surrounded the building.
b. At least three students dispersed/surrounded the building.

Hackl concludes that the difference between (12a) and (12b) is therefore a semantic one. He articulates the Minimal Number Predicate Generalization (MNPG; p. 46), a generalization stating that different types of comparative clauses have the following different restrictions on their numeral arguments relative to their (MNP) VP arguments. 1) Comparative clauses like *more than* are unacceptable with a numeral argument $n - 1$, where n is the minimal number required by the MNP the comparative takes as its verbal argument; and 2) Comparative clauses like *less than* are acceptable with a numeral argument n , where n is the minimal number required by the MNP the comparative takes as its verbal argument.

How does this relate to the semantics of *m*-words? There are three steps Hackl follows to get from the MNPG to the meaning of *m*-words:

1. He assumes – citing Bresnan (1973) – that “the degree function in *more than three* is given by *many – more* being the morphological spell-out of *many+er*. *Many* itself is analyzed parallel to other degree predicates/functions such as *tall*. It takes as [sic] innermost argument a degree and then denotes (the characteristic function of) a set of individuals that are numerous to degree d ” (p. 53).³ This is not the final version of his definition of *m*-words, but is the first of two steps in his ‘hybrid’ account between a gradable predicate analysis and a generalized quantifier analysis.

³This text and page citation is from the version of Hackl (2000) available at <http://www.linguistics.pomona.edu/mhackl/NThesis5.pdf>. Elsewhere, the page numbers cited refer to the original thesis.

2. Hackl argues that “not only do we need an NP argument for the gradable function *many* we also need the VP to be an argument of *many*” (p. 56). Specifically, both the NP and the VP need to be interpreted inside the *than*-clause. This argument is based on Bresnan’s (1973) observation that e.g. **I have never seen a taller man than my mother* is unacceptable as a result of the speaker’s mother not being a man. This is the second step towards a hybrid account of *m*-words. Specifically, these two arguments together result in *m*-words having a degree argument as well as two predicate arguments.
3. Finally, he argues that the numeral argument of the comparative clause “seems to ‘project out’ of the DP even though it is deeply embedded in it to clash or match with the predicate” (p. 45). This projection is what leads to the difference in acceptability between (12a) and (12b). The amount associated with the set of individuals must be attributed to something which can project out of the DP; Hackl assumes this is *many*.

The result is a meaning of *many* in (11), his (191), where it takes a degree argument as well as two sets of individuals as arguments. In Hackl’s resulting analysis, e.g. (15a) is analyzed as (15b), depicted in Figure 2.1.

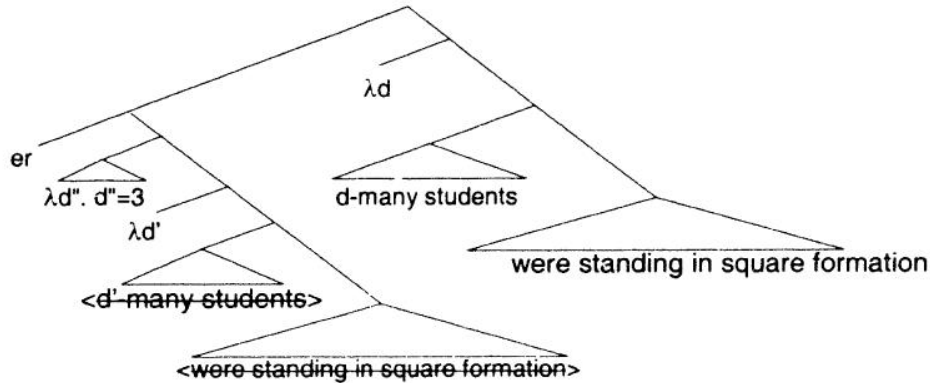
- (15) a. ??More than one student is meeting in the hallway.
 b. ??More students are meeting in the hallway than how many students there are in a meeting of one student in the hallway.

The *m*-word, qua quantifier, has to raise to the matrix of an MNP construction to yield an interpretable structure (p. 58–61). Because the *m*-word is embedded in the comparative clause, this raises as well. The *m*-word is interpreted inside of the *than*-clause despite raising overtly.⁴

⁴Curiously, and in contrast to Bresnan’s assumptions, Hackl’s account requires a null *many* even in comparatives like *fewer*. Specifically, while the underlying form of *More than three students were at my party* is roughly [-er [*d*-many students [be at my party]], the underlying form of *Fewer than three students were at my party* is [*fewer* [*d*-many students [be at my party]]] (p. 120). The analysis thus loses (some of) the morphological generalizations which motivated Bresnan’s account.

FIGURE 2.1: Hackl's analysis of MNPs

- (63) a. ?? More than three students were standing in square formation.
 b. [~~er~~ λd . $d=3$ & ~~d-many students were standing in square formation~~] [λd . ~~d-many students were standing in square formation~~]



Hackl uses the term “comparative determiner” to refer to this characterization of *m*-words, but we have no particular reason here to associate it with the comparative. I’ll therefore refer to Hackl’s account (and those in Heycock, 1995; Romero, 1998) as “Degree Determiner Approaches” (DDAs).

A note before I proceed: discussing Hackl’s arguments for analyzing *m*-words as degree determiners has required a discussion of Minimal Number Predicates and the contrast between the forms in (12), repeated here:

- (16) a. *More than one student is meeting.
 b. At least two students are meeting.

Hackl’s account of the difference in (16) relied on the presence of some unit of meaning in these expressions which took a degree argument and a set of individuals as an argument (corresponding to the VP) and which could scope outside of the comparative clause. Hackl associated this meaning with *m*-words, and below, I argue that this is not the right meaning of *m*-words. I do, however, assume the presence in many quantity constructions of a null quantity operator ‘QUANTITY,’ which I introduce in Section 2.2.3. This null operator is sufficient to preserve what-

ever aspects of Hackl’s analysis of MNPs one chooses.⁵

2.1.4 *M*-words as differentials

A final alternative semantic account for *m*-words focuses on their behavior as differential modifiers in comparatives, as in (17).

(17) Chris is much taller than Alex.

In accounts of differentials like Wheeler (1972), McConnell-Ginet (1973) and Klein (1982), and more recently Schwarzschild (2006), *m*-words are characterized as predicates of scalar intervals (‘delineations’ in McConnell-Ginet’s (p. 136) terminology) on par with numerals.

Klein analyses (17) as the result of applying the modifier *much* to the set of degrees in (18), which he takes to be the denotation of the comparative before it is modified by *much*.

(18) $\lambda d[\text{tall}(\text{chris},d) \wedge \neg \text{tall}(\text{alex},d)]$

He says:

... the set denoted by [(18)] – let us call it ‘*G*’ – will be relatively large.
... [I]t seems as though *G* represents the ‘distance’ between Chris and Alex with respect to the predicate *tall*. This makes it highly plausible that *much* should be interpreted as a measure on the set of *G* (p. 132).

In such an account, *m*-words serve two functions: first, they measure a set of degrees; second, they compare this measure to a contextually-valued standard.

⁵Amy Burke (p.c.) points out that (16a) is not unacceptable in every case. It’s fine, for instance, in a context in which the speaker has been informed that there will be a meeting of students but is expressing his ignorance at the exact number: “As for the students, all I know is that more than one student is meeting (tonight).” I have no account for why this is so, but it suggests that the difference between (16a) and (16b) might be of a different nature than Hackl argues.

$$(19) \quad \llbracket m\text{-word} \rrbracket^c = \lambda D_{\langle d,t \rangle} \lambda d'. \text{size}(D) = d' \wedge d' > s, s \text{ a contextual standard in } c.$$

I will define the measure function **size** informally for now: it is the function from a set of degrees d to a degree d' which is the size of the set of ds . In Section 3.4, I will define it more precisely as the operator ℓ .

Many proponents of this analysis have also been proponents of an account of degree constructions which does not employ degrees (McConnell-Ginet, 1973; Kamp, 1975; Klein, 1980, 1982), and they therefore illustrate the above characterization of m -words with different background assumptions than the ones used here. I will demonstrate this conception of m -words using the comparative morpheme as it is defined in (20), in keeping with the framework used throughout the rest of the dissertation (outlined in Chapter 1).⁶

$$(20) \quad \llbracket \text{-er} \rrbracket = \lambda D' \lambda D'' \lambda d. D'(d) \wedge \neg D''(d)$$

According to (20), the value of the comparative is the set of degrees d which are in D' and not in D : the set of degrees d to which Chris is tall but to which Alex is not tall in (17). A differential like *much* measures the size of this set of degrees. In these accounts, m -words additionally assert that the size of this set is relatively large.

$$(21) \quad \llbracket \text{Chris is much taller than Alex.} \rrbracket \\ = \exists d' [\text{size}(\lambda d. \text{tall}(\text{chris}, d) \wedge \neg \text{tall}(\text{alex}, d)) = d' \wedge d' > s]$$

(I assume that d' is bound in (21) via existential closure at the end of the utterance; see Chapter 3 for a more in-depth discussion of the semantics of the comparative.)

The rest of the chapter is devoted to arguing that this characterization of m -words – in which they measure the size of a set of degrees – is the right one, although I will amend (19) slightly.

⁶This particular version of the comparative dates back to Small (1924); Joly (1967); Ross (1969); Seuren (1973, 1984), and was introduced to account for the fact that NPIs are licensed in the comparative clause. The history and breadth of this analysis has been discussed in McConnell-Ginet (1973: Chapter 2) and more recently in Schwarzschild (2008).

2.1.5 A summary of accounts of *m*-words

M-words occur in a variety of environments, each suggesting a different meaning. These meanings can be sorted into two broad groups. First, *m*-words can be analyzed as restrictors/modifiers. The Bresnan-inspired account presented in Section 2.1.2 characterizes them as gradable predicates, restricting a set of individuals x to ones which contain d -many elements. This analysis is supported by sentences like *The many captives fled*, in which the *m*-word appears in the same syntactic configuration as a gradable adjective. The account presented in Section 2.1.4, in which *m*-words are compared to differentials, characterizes them as degree modifiers. In this account, *m*-words restrict a set of degrees d to ones which contain d' -many elements.

Second, *m*-words can be classified as determiners. This type of analysis is supported by *m*-words as they occur with NP complements but without overt determiners. This type of account has had two different instantiations: GQT analyzes *m*-words as determiners on par with e.g. *all* and *some*. In a more recent account, Hackl (2000) argues based on the presumed presence of *m*-words in *more*-comparatives that *m*-words pattern like other determiners in taking two property arguments (corresponding to the NP and VP denotations), but they differ from other determiners in that they additionally take a degree argument (corresponding to the size of a plurality of individuals).

As I've said, the goal of this chapter is to find a unified account of *m*-words, one which works for all of these instantiations of *m*-words. Before I do this, I will draw on some data which provide a unique view of the difference between the DDA (Degree Determiner Approach) and the DMA (Degree Modifier Approach).

Some DDA proponents have interpreted as evidence for their approach the semantic behavior of quantum phrases (e.g. *how many* and *how much*, the heads of quantity questions), which they assume are semantically composed in part by an

m-word. I argue against this method and conclusion by presenting a quantum phrase which is clearly semantically composed in part by an *m*-word – the Romanian *cît de mult* – and showing that the DMA can account for its unique semantic behavior. I then return to discuss the semantics of *m*-words in other constructions like prenominally and in English quantum phrases.

2.2 *M*-words and quantum phrases

An important difference between accounts that characterize *m*-words as modifiers (DMAs) and those that characterize them as determiners (DDAs) is whether or not they view *m*-words as contributing individual quantification to a sentence. In modifier accounts, *m*-words provide no quantification, and do not effect the type of the expression in which they occur (they are type $\langle\langle d, t \rangle, \langle d, t \rangle\rangle$, as in (22), repeated from (19)). In determiner accounts, *m*-words provide existential quantification over an individual variable (as in (23), repeated from (11)).

(22) $\llbracket m\text{-word}_{mod} \rrbracket = \lambda D_{\langle d, t \rangle} \lambda d'. \text{size}(D) = d' \wedge d' > s, s$ a contextually-valued standard.

(23) $\llbracket m\text{-word}_{det} \rrbracket = \lambda d \lambda P \lambda Q \exists x [|x| = d \wedge P(x) \wedge Q(x)]$

Proponents of the DDA have looked to quantity questions like *How many books must John read?* to provide evidence for the claim that *m*-words are individual quantifiers (Frampton, 1991; Huang, 1993; Heycock, 1995; Cresti, 1995; Fox, 2000; Romero, 1998). I will review the arguments for this claim – as an extension of the DDA – in this section, and then give reason to believe that they are mistaken. The semantics of quantity questions will ultimately help motivate the characterization of *m*-words as degree modifiers which I endorse here.

2.2.1 Ambiguity in quantity questions

Quantity questions exhibit a type of ambiguity which appears to be the result of the individual quantifier scoping with a modal or other quantifier. In this respect, the readings seem to be another instance of de dicto/de re ambiguity. Accounts of this ambiguity have argued that it is evidence for a) the claim that quantum phrases like *how many* are in fact semantically composed of a *wh*-operator and an *m*-word; and b) the claim that *m*-words contribute individual quantification. I discuss these readings below after introducing my assumptions about the semantics of quantity questions.

The semantics of questions

I assume here, based on the accounts in Karttunen (1977), that a question denotes a set of propositions which are its true possible answers.

- (24) a. $\llbracket \text{How tall is Joe?} \rrbracket = \lambda w' \lambda p \exists d [p(w') \wedge p = \lambda w. \text{tall}(w)(j, d)]$
 b. $\llbracket \text{How many books did Joe buy?} \rrbracket$
 $= \lambda w' \lambda p \exists d [p(w') \wedge p = \lambda w \exists X [\text{books}(w)(X) \wedge |X| = d \wedge \text{buy}(w)(j, X)]]$

Both questions in (24) are of type $\langle s, \langle \langle s, t \rangle, t \rangle \rangle$; I assume that the world argument w' is filled in by the world of evaluation. For matrix interrogatives, in the absence of an additional operator, this is the actual world, which I will depict here as $w^\@$.

The gradability question in (24a) and the quantity question in (24b) have in common an existential degree quantifier, presumably provided by the *wh*-phrase.⁷ This means that both gradability and quantity questions denote sets of propositions which differ based on the value of a degree which satisfies the proposition.

Given what it means to be tall and to own books, the predicates *be tall* and *have d books* in the questions in (24) are downward-entailing. This means that, if it's true that Joe bought 5 books in w then it's also true that he bought 4 books in w and 3

⁷Although see Jacobson (1995); Caponigro (2004); Rett (2006b) for arguments that (most) *wh*-phrases do not contribute existential quantification, which is rather provided by existential closure.

books in w and so on. (It also means that if it's true that Joe is tall to the degree '6ft' in w then he is tall to the degree '5ft' in w and to the degree '4ft' in w and so on.) As a result, the set denoted by the truth conditions in (24b) – in a world w' in which Joe bought 5 books – contains more than one proposition:

$$(25) \quad \left\{ \begin{array}{l} \lambda w. \text{Joe bought 5 books in } w. \\ \lambda w. \text{Joe bought 4 books in } w. \\ \lambda w. \text{Joe bought 3 books in } w. \\ \lambda w. \text{Joe bought 2 books in } w. \\ \lambda w. \text{Joe bought 1 books in } w. \end{array} \right\}$$

Although (25) is the extension of the question in (24b), the only felicitous answer to this interrogative is *Joe bought 5 books*, which is the most informative proposition in the set. I assume, following Dayal (1996), that the less informative propositions (e.g. *Joe bought 4 books in w*) cannot function as felicitous answers because of a semantic requirement that the answer to a question be the most informative true proposition.

There are two ways in which the quantity question in (24b) differs from the gradability question in (24a). First, the proposition p in (24b) contains an individual quantifier $\exists X$. This corresponds to the fact that (24b) presupposes the existence of a plurality (on the assumption that the question itself is presupposed to have a non-empty denotation). Second, (24b) contains a cardinality operator $|X|$.

Degree determiner accounts (starting with Frampton, 1991) attribute both of these differences to the existence of an *m*-word in quantum phrases and thereby in quantity questions. The claim is that the component *how* means roughly 'what d ,' and the component *d-many NP* – where d is an interpretation of the trace left by *how* – has the meaning of a degree determiner. I will first describe the ambiguities exhibited by quantity questions and then give examples of the syntactic structures that DDA attributes to each interpretation of a quantity question.

The amount/object ambiguity

The question in (26) has been claimed to be ambiguous between an object reading – in which the individual quantifier scopes outside of the universal modal – and an amount reading, in which the individual quantifier scopes below the modal.

(26) How many books must John read?

(27) OBJECT INTERPRETATION: $\exists X \gg \text{must}$

$\lambda p \exists d [p(w^a) \wedge p = \lambda w \exists X [\text{books}(w)(X) \wedge \text{must}(w)[\lambda w'. \text{read}(w')(j, X)] \wedge |X| = d]]$

(28) AMOUNT INTERPRETATION: $\text{must} \gg \exists X$

$\lambda p \exists d [p(w^a) \wedge p = \lambda w. \text{must}(w)[\lambda w' \exists X [\text{books}(w')(X) \wedge \text{read}(w')(j, X) \wedge |X| = d]]]$

(27) can be phrased as “For what d are there d -many books X such that John must read X ?” A scenario that lends itself to this interpretation is one in which John is taking a syntax class, and his teacher requires that he read *Syntactic Structures*, *Knowledge of Language* and the *Minimalist Program*. In this scenario, there are 3 books such that John has to read them.

There is one type of sentence for which the object reading can be isolated pragmatically. Just as the existential quantifier can take scope with respect to a modal, it can take scope with respect to the embedding verb *know*. We can isolate the object reading in a question about the knowledge of a subject which is incapable of counting. A dog, for instance, can know that he has buried Bones A , B and C , but it is hard to imagine that he knows he has buried 3 bones. In such a scenario, the amount reading of the interrogative *How many bones does Rover know he's buried?* is ruled out by world knowledge, and so the object reading is the only available one.

(28) can be phrased as “For what d must it be the case that John read d -many books X ?” This reading is most salient in a scenario in which John is taking a speed-reading course. In such a course, the professor would require that John read 3 books, although there will be no 3 books such that the professor requires John read those particular books.

The amount reading can be isolated with ‘creation’ predicates (Heycock, 1995): it is pragmatically odd to inquire about specific items – rather than amounts of items – if the items in question have yet to be created. So the interrogatives *How many stories is Diana likely to invent?* or *How many children is Doug likely to have?* are generally thought of as unambiguous, receiving only the amount reading.⁸

Proponents of the DDA attribute the ambiguity of quantity questions to the ability of the *m*-word (which encodes the individual quantifier) to split off from the rest of the quantum phrase and scope with the noun phrase. Typically, the scope-taking is represented syntactically (in ‘syntactic reconstruction’ accounts). Other methods of representing the ambiguity (‘semantic reconstruction’ accounts, Cresti, 1995; Sharvit, 1998) exist, but I will not discuss them here.

DDA analysis of the ambiguity

The amount/object ambiguity is represented in the DDA by the division of the quantum phrase into two parts: *how*, corresponding to ‘what *d*,’ and *m*-word+NP, corresponding to *d*-many NP, a phrase which contributes existential quantification over individuals. I’ll make explicit the syntactic and semantic assumptions of this

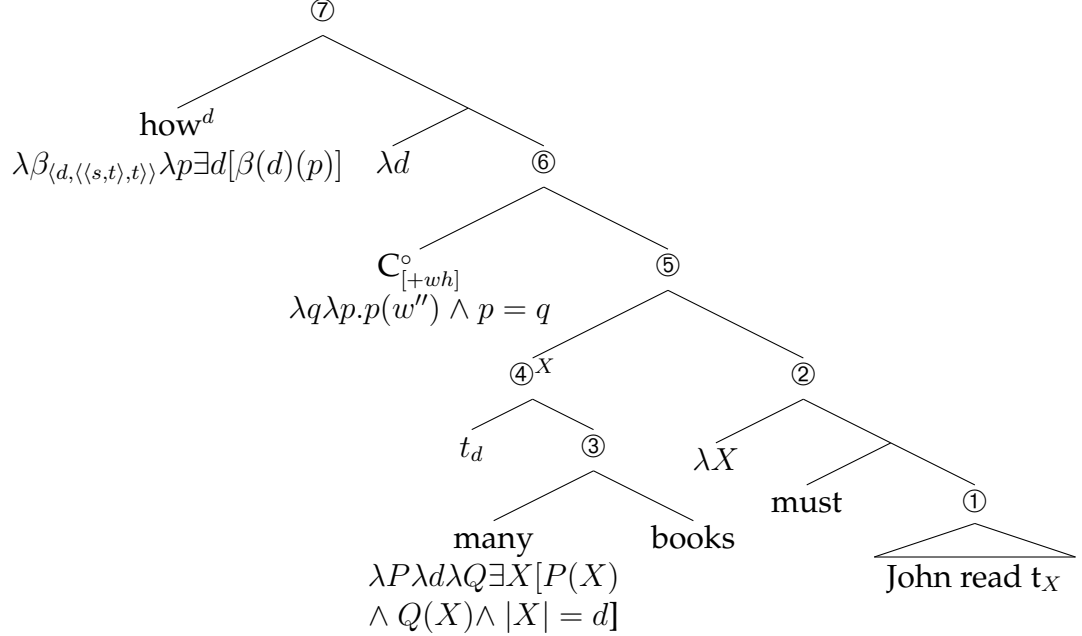
⁸I have illustrated each interpretation with a different scenario, which is compatible with quantity questions being ambiguous, but also with the amount reading arising as an implicature from the object reading. If John has to read books *A*, *B* and *C*, then it’s also the case that he has to read 3 books, but not vice-versa. In an attempt to show that the amount/object ambiguity is a true ambiguity, Fox (2000) provides a single scenario in which he argues a quantity question is in fact ambiguous (dubbed ‘S1,’ p. 152):

After a day of interviews, Mary finds 7 people who really impress her, and she decides to hire them. None of the other people impress her. However, she knows that she needs more than 40 people for the job. After thinking about it for a while, she decides to hire 50 the 7 that she likes and 43 others to be decided by a lottery.

The claim is that this is a scenario in which the question *How many people did Mary decide to hire?* has two truly distinct answers: *Seven*, corresponding to the object interpretation (there were seven people such that Mary decided to hire them); and *Fifty*, corresponding to the amount interpretation (Mary decided that she needed to hire 50 people, whoever they might be). However, as a demonstration of the amount/object ambiguity, this scenario is dubious: in this case, as Fox himself points out, the interrogative could instead be asking about two temporally distinct instances of decision-making, rather than two amounts. As a result, it is not at all obvious that the ‘amount/object ambiguity’ is in fact an ambiguity.

approach, relying on the account in Chapter 3 of Romero (1998). Below are the two interpretations of the interrogative *How many books must John read?*

(29) OBJECT INTERPRETATION

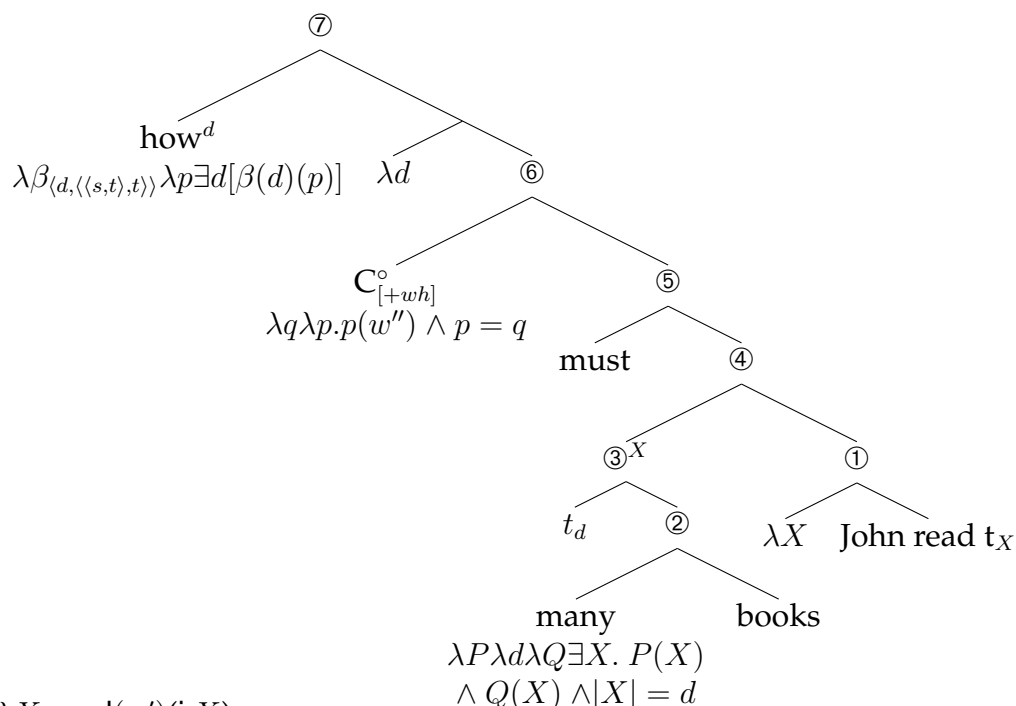


- ① $\lambda w' . \text{read}(w')(j, X)$
- ② $\lambda X . \text{must}(w)[\lambda w' . \text{read}(w')(j, X)]$
- ③ $\lambda d \lambda Q \exists X [\text{books}(w)(X) \wedge Q(X) \wedge |X| = d]$
- ④ $\lambda Q \exists X [\text{books}(w)(X) \wedge Q(X) \wedge |X| = d]$
- ⑤ $\lambda w \exists X [\text{books}(w)(X) \wedge \text{must}(w)[\lambda w' . \text{read}(w')(j, X)] \wedge |X| = d]$
- ⑥ $\lambda p . p(w^\circ) \wedge p = \lambda w \exists X [\text{books}(w)(X) \wedge \text{must}(w)[\lambda w' . \text{read}(w')(j, X)] \wedge |X| = d]$
- ⑦ $\lambda p \exists d [p(w^\circ) \wedge p = \lambda w \exists X [\text{books}(w)(X) \wedge \text{must}(w)[\lambda w' . \text{read}(w')(j, X)] \wedge |X| = d]]$

A moved element is coindexed with its trace via a superscript that corresponds to the type of the trace. (I assume that the type of a trace left by a moved element corresponds to the type this moved element quantifies over.) A variable left by a trace is λ -abstracted over immediately before the element is interpreted in its moved position. The fact that an interrogative denotes a set of propositions is due to the [+wh] \mathbb{C}° , which is in a selectional relationship with the *wh*-clause.

Because the *m*-word is always pronounced adjacent to *how* in surface structure, a lower reading of the constituent *d*-many NP – shown in (28) and depicted below in (30) – is the result of syntactic reconstruction after the constituent is raised to its surface position immediately below the C° .

(30) AMOUNT INTERPRETATION



① $\lambda X. \text{read}(w')(j, X)$

② $\lambda d \lambda Q \exists X [\text{books}(w')(X) \wedge Q(X) \wedge |X| = d]$

③ $\lambda Q \exists X [\text{books}(w')(X) \wedge Q(X) \wedge |X| = d]$

④ $\exists X [\text{books}(w')(X) \wedge \text{read}(w')(j, X) \wedge |X| = d]$

⑤ $\lambda w. \text{must}(w) [\lambda w' \exists X [\text{books}(w')(X) \wedge \text{read}(w')(j, X) \wedge |X| = d]]$

⑥ $\lambda p. p(w^\circ) \wedge p = \lambda w. \text{must}(w) [\lambda w' \exists X [\text{books}(w')(X) \wedge \text{read}(w')(j, X) \wedge |X| = d]]$

⑦ $\lambda p \exists d. p(w^\circ) \wedge p = \lambda w. \text{must}(w) [\lambda w' \exists X [\text{books}(w')(X) \wedge \text{read}(w')(j, X) \wedge |X| = d]]$

These trees demonstrate the mechanics of the Degree Determiner Approach as it has been applied to the semantics of quantity questions. The approach is based on the assumption that quantum phrases, like other degree quantifiers, involve a semantically contentful *m*-word.

2.2.2 Evidence against the Degree Determiner Approach

There are two arguments against the DDA analysis of quantum phrases in quantity questions. The first is simple but not damning: many languages have quantum phrases which don't involve an *m*-word. This means that, in order to maintain the DDA for quantity questions cross-linguistically, one has to postulate a null *m*-word in quantum phrases for these languages.

The second argument is more complex and more damning; it regards the French “split-NP construction” (Obenauer, 1994; Rizzi, 1990; Dobrovie-Sorin, 1992).

- (31) a. Combien de livres faut-il que vous lisiez?
how-many of books it's.necessary that you read
'How many books must you read?' (ambiguous)
- b. Combien faut-il que vous lisiez de livres?
how-many it's.necessary that you read of books
'How many books must you read?' (unambiguous)

The French quantum phrase *combien* is arguably composed of a *wh*-phrase and an *m*-word (although e.g. *many* is usually translated as *beaucoup*, *bien d'gens* means 'many people'). The French word *comme* means 'how' – it is a [+wh] degree quantifier – but is curiously restricted in French to exclamatives (*Comme elle est belle!* means 'How beautiful she is!').

In French quantity questions the complement NP can be stranded from the quantum phrase, as shown in (31b). This has a significant effect on the possible interpretations of the quantity question. While (31a) is ambiguous just like its English counterpart, (31b) is unambiguous. It can receive only the amount reading (É. Kiss, 1992; de Swart, 1992).

There are two ways of looking at the French data. On the one hand, we could adapt the DDA account of English quantity questions directly to French and argue that *combien* is semantically composed in part of an *m*-word, and that this *m*-word encodes individual quantification. But the split-NP data show that this would

erroneously predict that expressions like (31b) would be just as ambiguous as its counterpart in (31a).

On the other hand, we could disassociate the individual quantifier from the quantity phrase *combien*. We *could* do this by claiming that French quantum phrases involve a null *m*-word in addition to the *-bien* in *combien*, but it's important to see that at this point we have no evidence for associating the individual quantifier with an *m*-word. A more straightforward approach would be to claim that French quantum phrases involve a null operator which encodes individual quantification and which is independent of the meaning of *m*-words.

One consequence of disassociating the individual quantifier from *m*-words is that it's not clear what's going on in languages (like English) whose quantum phrases involve clear instances of overt *m*-words. I address English in Section 2.5.1. Perhaps even more interesting a consequence of this disassociation is that it predicts that the individual quantifier (and the operator which encodes it) can interact with *m*-words. We'll see this prediction borne out in the discussion of Romanian in Section 2.4.

2.2.3 A null quantity operator

What does it mean to say that the individual quantifier is “closely associated” with the NP? The individual quantifier can't be a part of the NP itself for obvious reasons: NPs need not be existentially bound. In this section, I argue following Cresswell (1976) that NPs can occur with a null ‘quantity operator,’ which contributes existential quantification over individuals and relates those individuals to a quantity degree. This amounts to the same compositional semantics as the DDA proposals above; the crucial difference is that it comes with no commitments about the presence of *m*-words in these sentences and consequently about the meaning of *m*-words.

Cresswell (1976) suggested – independent of the semantics of quantity questions – that plural and mass nouns can function as two-place predicates of the form ‘ x is a y -membered set of men’ (for plural count nouns) and ‘ x is an amount of NP y ’ (for mass nouns). He proposed two null quantity operators to produce this effect, ‘Pl’ for ‘plurality’, an operator for count nouns, and ‘Tot’ for ‘totality,’ an operator for mass nouns.⁹

An alternative to Cresswell’s account is one in which nouns are systematically ambiguous between a traditional denotation like (32a) and one with a degree argument, as in (32b).

- (32) a. $\llbracket \text{pizza}_1 \rrbracket = \lambda X. \text{pizza}(x)$
 b. $\llbracket \text{pizza}_2 \rrbracket = \lambda X \lambda d. \text{pizza}(X) \wedge |X| = d$

I don’t consider these approaches significantly different and therefore follow Cresswell in encoding these meanings in a null element. I depart from him in not differentiating between operators which correspond to count and mass nouns. I assume that this null quantity operator is a type-shifter which only occurs in the presence of overt degree morphology.

- (33) $\llbracket \text{QUANTITY} \rrbracket = \lambda P \lambda d \lambda Q \exists X. P(X) \wedge Q(X) \wedge \mu(X) = d$

QUANTITY is a function from a set of individuals plus a degree plus a property to a truth value. The order of these arguments comes from the constituency of forms like *Three boys ran*, shown in (34).

- (34) $[\text{IP} [\text{DP three} [\text{QUANTITY boys}]] [\text{VP ran}]]$

However, in quantity questions like *How many boys ran?*, the position occupied

⁹There are more recent proposals similar to Cresswell’s. Kayne (2007) proposes NUMBER for syntactic reasons, and argues that the *de* in French NPs “...provides a way of detecting the presence of (unmodified) AMOUNT (parallel to the *of* in *a pint *(of) beer*),” p. 836 (see also Abeillé et al., 2006). Schwarzschild (2006) proposes MON, also for syntactic reasons: *m*-words occur in the specifier of a functional projection above NPs, resulting in agreement in e.g. Italian (with *molt*). This head additionally constrains the dimensions of the noun in terms of monotonicity.

by *three* in *Three boys ran* is instead occupied by the trace of the quantum phrase, type $\langle d \rangle$. This trace is λ -abstracted over before the interpretation of the quantum phrase in its raised position (as in (35); a more detailed explication will follow shortly).

(35) $[_{CP} \text{how-many}^d \lambda d [_{IP} [_{DP} t_d \text{QUANTITY boys}] [_{VP} \text{ran}]]]$

This means that, in our discussion of quantity questions, it will be possible and useful to discuss the set of degrees denoted by QUANTITY once its two property arguments are filled in. That is how I will present the meaning of the quantity operator here.

Take a scenario in which there are three pizzas on the table: *m*(ushroom), *p*(roscuito) and *e*(ggplant). In this scenario, (36a) denotes (36b):

(36) a. $\lambda d \exists X [\text{pizzas}(X) \wedge \text{on-table}(X) \wedge \mu(X) = d]$
 b. $\{1,2,3\}$

μ is a function from an individual to a measure. If its complement is a count noun (barring exceptions), it is a function from a plural individual to the cardinality of that plural individual. If its complement is a mass noun (again barring exceptions), it is a function from a (dense) individual to its measure. Whereas the dimension of measurement for a plural is always cardinality, the dimension of measurement for a dense individual varies with context (see Schwarzschild, 2006, for an interesting account of restrictions on what this dimension can be).

The set of degrees in (36b) is composed of the quantities of any part of those pizzas which are on the table. The maximal plurality of the pizzas on the table is the one containing all three pizzas, $\{m,p,e\}$, and so the number 3 is in the set. Other pluralities are $\{m,p\}$, $\{m,e\}$, and $\{e,p\}$, all of which have the cardinality of 2, so the number 2 is in the set. Finally, $\{m\}$, $\{p\}$ and $\{e\}$ are also pizzas on the table, and so the number 1 is in the set.

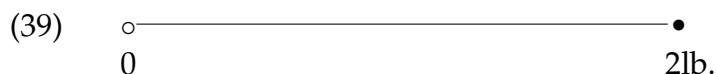
The same goes for expressions with dense individuals. In (33), x is a portion of matter and $\mu(x)$ is a measure of a portion of matter. Again, the dimension of measurement (e.g. volume, height) varies with context.

- (37) a. How much dough did you buy? (*salient dimension: weight*)
 b. How much yarn did you buy? (*salient dimension: length*)

When its P and Q arguments are filled in, and in a scenario in which weight is the salient measure, QUANTITY denotes a set of degrees including the weight of the heaviest portion of matter as well as all real numbers between this weight and zero (although not including zero). In a scenario in which there is a 2-lb. lump of pizza dough on the counter, (38a) denotes (38b).

- (38) a. $\lambda d \exists x [\text{pizza-dough}(x) \wedge \text{on-table}(x) \wedge \mu(x) = d]$
 b. $\{\dots .1, \dots .2, \dots .3, \dots, 1.8, \dots 1.9, \dots 2\}$

The set of degrees in (38b) is dense. The set includes its upper bound of 2lbs. but does not include its lower bound of zero, as illustrated in (39).



We have arrived at this set of degrees the same way as above: for each sub-lump of dough x , we take the relevant measure μ of x (in this case, weight-in-pounds). The maximal lump x is 2lbs., so that degree goes in the set. The weight of any smaller sub-lump also goes in the set.

As a side note, the context-sensitivity of QUANTITY could potentially account for the cardinal/proportional ambiguity observed by Westerstahl (1985) and Partee (1989) (and discussed in Section 2.1.1). At the very least, this quantity operator allows for a semantic account of these constructions with the same mechanisms for solving the problem as the DDA.¹⁰

¹⁰Doetjes (1997: Chapter 6) observes that the cardinal and proportional readings occur with number measure phrases as well, a generalization which is compatible with encoding the cardinal/proportional ambiguity in quantity operators instead of m -words.

To sum up: the denotation of a quantity question includes an individual existential quantifier and a measure function. Although the DDA attributes both of these components of meaning to the *m*-word in the quantum phrase, there is evidence against this. Data from French indicate that the individual quantifier is closely associated with the NP. I follow Cresswell (1976) in encoding both the existential quantifier and the measure operator in the null quantity operator (QUANTITY). This quantity operator is needed independently for the compositional semantics of numeral constructions like *Three boys ran*. We therefore have nothing to lose in adopting them for quantity questions and nothing to gain by attributing the same meaning, redundantly, to *m*-words.

An account like this which encodes the measure operator and existential quantifier in null quantity operators raises the question: “What, then, is the meaning of *m*-words?” This is the subject of the next section.

2.3 *M*-words as degree modifiers

In this section, I present a more precise characterization of *m*-words as degree modifiers based on their behavior of *m*-words as differentials. I then introduce quantity questions in Romanian: Balkan languages like Romanian differ from many other languages in that they appear to have two types of quantum phrases: one with an *m*-word and one without. The final part of this section demonstrates how the assumption that *m*-words are degree modifiers can straightforwardly account for the semantic differences between the two different kinds of quantity questions in Romanian.

2.3.1 The meaning of *m*-words

The measure operator ℓ

The data from French argue against the DDA, which classifies *m*-words as determiners. As discussed in Section 2.1.5, an alternative to the DDA is the DMA, which holds that *m*-words are degree modifiers. In (40), based on the definition in (19) from Klein (1982), an *m*-word is a function from a set D of degrees to a (singleton) set containing d' , the measure of D . The second conjunct in the definition below restricts the set of degrees to those which exceed a contextually salient standard s .

$$(40) \quad \llbracket m\text{-word} \rrbracket = \lambda D \lambda d'. \ell(D) = d' \wedge d' > s \text{ (not final)}$$

(40) differs from (19) in that it has the measure operator ℓ . ℓ is distinct from the measure μ in QUANTITY; the domain of μ is an individual, so it is a function from this individual to a set of positive real numbers corresponding to the cardinality/weight/length/etc. of the parts of this individual. Given the proposal that *m*-words are measures of sets of degrees, the argument of an *m*-word is a set of degrees and therefore the measure operator employed by *m*-words must have as its domain a set of degrees (rather than an individual). The range of this operator must correspond to the measure of that set of degrees.

In mathematical measure theory, the size of a set of numbers is calculated as the length of an interval of numbers, as in (41). An interval is a set of degrees such that if it contains two degrees d and d' it contains all the degrees between d and d' .¹¹ This definition is from Gordon (1994); see also Wilcox and Myers (1994) for a useful introduction to measure theory.

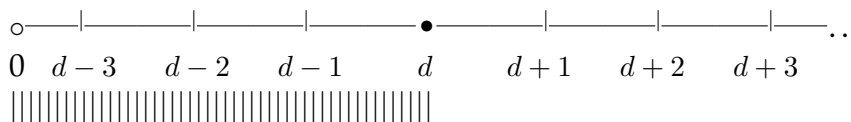
$$(41) \quad \text{LENGTH}(\ell)_{def}: \\ \text{The length of a bounded interval } I \text{ with endpoints } a \text{ and } b \text{ (where } a < b \text{) is}$$

¹¹I follow the mathematics literature here in using the term 'interval' to refer to a set of numbers (or degrees). This notion of interval is distinct from the one used in Schwarzschild and Wilkinson (2002), which uses the term 'interval' to refer to non-convex as well as convex intervals.

defined by $\ell(I) = b - a$, where a ‘bounded’ interval is an open, closed, or half-open interval. If I is (a, ∞) , $(-\infty, b)$ or $(-\infty, \infty)$, then $\ell(I) = \infty$.

The argument of an m -word meaning will always be a half-open interval, with zero as its open endpoint.¹² Recall that QUANTITY is a function from an individual to a set of degrees which are measures of that individual (its cardinality if it is a plural individual, its length/weight/height, etc. – depending on context – if it is not). Because μ always measures an individual which satisfies two particular predicates, the measure of this individual is never zero, so the value of QUANTITY – and the domain of m -words – will always have an open lower bound of zero. Its upper bound will be the measure of the longest/heaviest/most numerous etc. individual, and this bound will be closed (inclusive). An illustration is below in Figure 2.2.

FIGURE 2.2: $\lambda d \exists X [P(X) \wedge Q(X) \wedge \mu(X) = d]$



This is an illustration of a dense set of measures; in the case of cardinalities, this set will not be dense but will still be downward-monotonic for integers (though see Fox and Hackl 2005, Fox 2008 and Bale 2008 for discussion of the claim that all scales invoked by natural language are dense). The measure ℓ of this set of measures is the upper bound d minus the lower bound zero, or d . Notice that, for downward-scalar sets like the one illustrated in Figure 2.2, the measure ℓ of the set is always the same as the maximum measure in the set. This will be important in the analysis of Romanian quantity questions in Section 2.4.2.

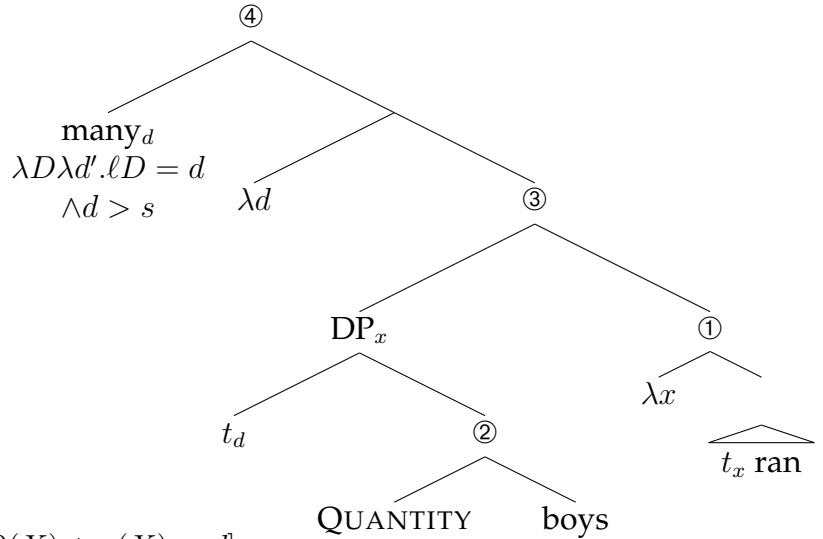
¹²Given an interval I with endpoints a_1 and a_2 , a_1 and a_2 are closed bounds iff, for all values of x st. x belongs to I , $a_1 \geq x \geq a_2$. a_1 and a_2 are open bounds iff, for all values of x , $a_1 < x < a_2$. In illustrating these scales, I will use an open circle \circ to denote an open bound and a closed circle \bullet to denote a closed bound.

There are some other interesting aspects of this proposal of *m*-words to discuss. But first, I'll illustrate the meaning of the definition in (40) and the measure operator ℓ in a derivation of a prenominal *m*-word construction.

2.3.2 Prenominal *m*-words

In combination with the quantity operators proposed above, this meaning of *m*-words suffices to give a compositional semantics for all of the sentences discussed above.

(42) Many boys ran.



① $\lambda X.\text{ran}(X)$

② $\lambda d\lambda Q\exists X[\text{boys}(X) \wedge Q(X) \wedge \mu(X) = d]$

③ $\exists X[\text{boys}(X) \wedge \text{ran}(X) \wedge \mu(X) = d]$

④ $\lambda d'.\ell(\lambda d\exists X[\text{boys}(X) \wedge \text{ran}(X) \wedge \mu(X) = d]) = d' \wedge d' > s$

⑤ $\exists d'[\ell(\lambda d\exists X[\text{boys}(X) \wedge \text{ran}(X) \wedge \mu(X) = d]) = d' \wedge d' > s]$

In (42), the DP subject raises (presumably to satisfy the EPP), and the *m*-word *many* raises for type reasons. (Recall that the order of the arguments of the quantity operator QUANTITY was determined based on the surface word order of the arguments in e.g. *Three boys ran.*) The *m*-word *many* takes as its argument a set of degrees d corresponding to the amount of boys who ran. Its value is the (singleton) set of degrees $\{d'\}$, where d' is the size of the set of degrees d .

I assume that the degree d' in the value of the m -word is bound via existential closure in lieu of an overt degree quantifier like *as* or *too*. This is reflected in the truth conditions in ⑤.¹³ Also in these truth conditions is the restriction on d' that it exceed a contextual standard s . I'll discuss this aspect of the meaning of m -words in more depth in the next subsection.

The truth conditions in ⑤ are slightly different than those typically associated with pre-nominal m -word constructions, but equivalent. Instead of a proposition which is true when the number of boys who ran is high (relative to some standard of quantities of boys or boys who ran), (42) is true when the size of the set of amounts of boys who ran is high (relative to some standard of measures of quantities). Let's suppose that there are 20 boys who ran. In this scenario, then, the set of degrees d in (42) is $\{1, 2, 3, \dots, 20\}$. The set of degrees d' is the singleton set $\{20\}$, which is the size of the set (because it is a non-dense scale, this size corresponds to the number of degrees in the set). It is this degree which is then compared to a standard s and which is existentially bound.

A pragmatic variable, s receives its value from context. (Discussions of the nature of this standard and how it is valued can be found in Kennedy (2007) and references therein.) When a set of degrees d (where d -many boys ran) is compared to a contextual standard, that standard is a point on a scale of degrees corresponding to quantities of sets of boys. But in (42), it's the set of degrees d' – the size of the set of degrees corresponding to the quantity of boys who ran – being compared to a contextual standard. This standard is therefore a point on a scale of degrees

¹³The notion of existential closure employed here and throughout this chapter affects the type of a denotation (in (42), it takes a degree predicate and returns a proposition). This aspect of the analysis allows for a consistent semantics of m -words in sentences like *Many boys ran* above and sentences with overt degree quantifiers like *Too many boys ran*. However, as Roger Schwarzschild (p.c.) points out, if this conception of existential closure were fully general, we would expect that utterances like *solution* to be semantically well-formed (and to have the meaning 'There is a solution'). Although such utterances might be ruled out for independent syntactic reasons, it is worth pointing out that this mechanism may have negative consequences.

corresponding to sizes of sets of degrees corresponding to quantities.¹⁴

2.3.3 Other aspects of *m*-words

Comparison to a standard

The definition in (40) lexically encodes the comparison to a standard discussed above. This makes sense given the meaning of sentences like (44a), but it doesn't accord with the meaning of sentences like (44b).

- (44) a. Joe has many shoes.
b. Joe has as many shoes as Bill.

For (44b) to be true, it need not be the case that Joe or Bill have many shoes; (44b) could be true even if Joe and Bill only have one or two pairs of shoes. This shows that not every instance of an *m*-word carries with it the entailment that a quantity is high relative to a contextual standard.

The same pattern is exhibited in (45a), indicating that the scope of this phenomenon extends beyond *m*-words.

- (45) a. Joe is tall.
b. Joe is as tall as Bill.

In Chapter 3, I present an account of the distribution of this meaning (comparison to a contextual standard), which I refer to as 'evaluativity'. For now, it is important only to point out that there is reason to disassociate the meaning of *m*-words from comparison to a standard, pace the definition in (40) and those in e.g. Klein (1982).

¹⁴The nature of this standard is clearly harder to determine than those discussed in e.g. Siegel's (1977) and Kennedy's work (ones associated with gradable adjectives in positive constructions *Joe is tall*). This relative complication is reflected elsewhere in language: standards associated with gradable adjectives can be valued (or modified, as Kennedy (2007) argues) by *for*-PPs, while there are no overt modifiers of standards associated with *m*-words or quantities.

- (43) a. Joe is tall for a 4-year-old.
b. *Many boys went to the park for a busload.

Thus a final version of the definition of *m*-words is as in (46):

$$(46) \quad \llbracket m\text{-word} \rrbracket = \lambda D \lambda d'. \ell(D) = d' \text{ (final)}$$

In this (final) characterization of *m*-words, they denote a function from a set D of degrees d to a (singleton) set of degrees d' which is the measure of D .

A brief note on the type of *m*-words in (46): here, *m*-words are functions from a set of degrees to a set of degrees (degree modifiers). The argument d' of an *m*-word must be potentially available for modification (by e.g. *very*) and overt quantification (by e.g. *too*), as the examples in (47) demonstrate.

- (47) a. We didn't see very many sailboats out this morning.
b. We ordered too much sushi.

Consequently, *m*-words do not encode existential degree quantification, and this analysis relies on existential closure to bind degree variables in the absence of overt degree quantifiers.

There is a different possible characterization of the semantics of *m*-words which may at first glance appear to have equivalent empirical coverage: *m*-words are functions from sets of degrees to degrees, type $\langle \langle d, t \rangle, d \rangle$, as in (48).¹⁵

$$(48) \quad \lambda D. \ell(D)$$

This alternative analysis is *prima facie* attractive in that it could make use of a generalized type-shifter which is a function from an entity d to the singleton set containing that entity $\{d\}$ (type $\langle d, t \rangle$; ${}^{\cup}d'$ from Partee 1987). *M*-words would therefore parallel a Fregean analysis of *the* in the individual domain, $\lambda x. \iota(x)$, and the analysis would therefore not require existential closure to bind d' . However, this characterization of *m*-words would be inadequate for a semantics of the *m*-word equivalent of positive constructions, or expressions which contain an *m*-word but

¹⁵Thanks to Angelika Kratzer and Roger Schwarzschild for discussion here.

no degree quantifier. Specifically, the sentence in (42) would name a degree instead of a proposition (would have the type $\langle d \rangle$).

Differences amongst *m*-words

The difference between *many* and *much* seems to roughly correlate with whether they modify count or mass nouns (although see Chierchia, 1998; Solt, 2008, for recent discussions of exceptions to this generalization). Another way of thinking about this difference is in terms of whether the domain of the *m*-word – its argument *D* – is a dense or a non-dense set of degrees.

This latter characterization is consistent with the idea that (46) is the definition of all *m*-words, although they might differ on the restrictions they place on the nature of *D*. Specifically, while *many* could require that its domain be a non-dense set of degrees, *much* could require that its domain be a dense set of degrees. Restricting the difference between *many* and *much* (and *few* and *little*) to this minor difference in the characterization of their domains is in accord with the fact that many languages use a single word for both (for instance, the Balkan languages, as we'll see shortly).

Similarly, the definition of *m*-words in (46) can be used to discuss the differences between positive and negative *m*-words (the difference between *many* and *few*). I'll discuss the differences of these *m*-words in terms of their properties in the excessive construction to avoid the issue of evaluativity raised when we look at the words preominally (as in *Joe has many shoes*).

- (49) a. Joe failed too many students to receive the Teaching Award.
 b. Bill failed too few students to receive the Teaching Award.

Take a scenario in which the Teaching Award is typically given to teachers who fail around five students a year. The fact that Joe has failed 20 students and Bill has failed only two, then, makes them poor candidates for the Teaching Award. Both

of the sentences in (49) are true in this scenario; this is depicted below.

FIGURE 2.3: Teaching Awards

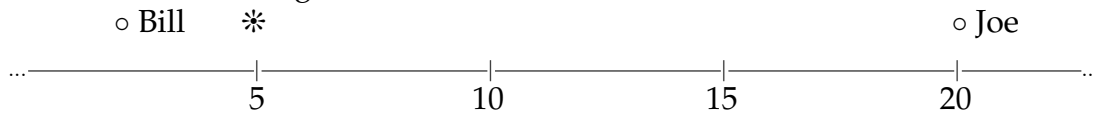


Figure 2.3 demonstrates the difference between *many* and *few*: both of the sentences in (49) describe the position of some degree on a scale with respect to the degree of comparison invoked by the excessive. The *m*-word in (49a) is *many*, and the sentence as a whole is true when the number of students Joe has failed is **higher** than the standard. The *m*-word in (49b) is *few*, and the sentence as a whole is true when the number of students Bill has failed is **lower** than the standard.

This indicates that *many* and *few* differ only with respect to the order of the scale with which they are associated. Recall from the discussion in Chapter 1 that I assume that degree scales are triples $\langle D, <_{\mathcal{R}}, \Psi \rangle$ with D a set of degrees, $>_{\mathcal{R}}$ a total ordering on D , and Ψ a dimension (in this case, ‘quantity’). This assumption allows us to build the difference between *many* and *few* (and *much* and *little*) into the difference between the order of the scale onto which the degrees d are mapped. Once again, this indicates that *m*-words differ only in the restrictions they place on D , and supports the claim that (46) is the definition of *m*-words generally. (See Chapter 3 for a more in-depth discussion of antonymy.)

2.4 Romanian quantity questions

This section presents the strongest support for the analysis of *m*-words in (46): I argue here that we need an analysis of *m*-words as degree modifiers to account for 1) the fact that *m*-words are optional in Balkan quantity questions and 2) the unexpected semantic differences between quantity questions with an *m*-word and those without. The discussion starts with a compositional semantics of the unmarked

quantity question in Romanian, which has the same meaning in every respect as English quantity questions. However, because of important morphological differences between the two languages, I suspend discussion of quantity questions in English until Section 2.5.1.

2.4.1 Monomorphemic quantum phrases in Romanian

In Romanian, the unmarked quantity question strategy involves the monomorphemic *wh*-operator *cît* (as before, I refer to the *wh*-operator in a quantity question as the ‘quantum phrase’).¹⁶

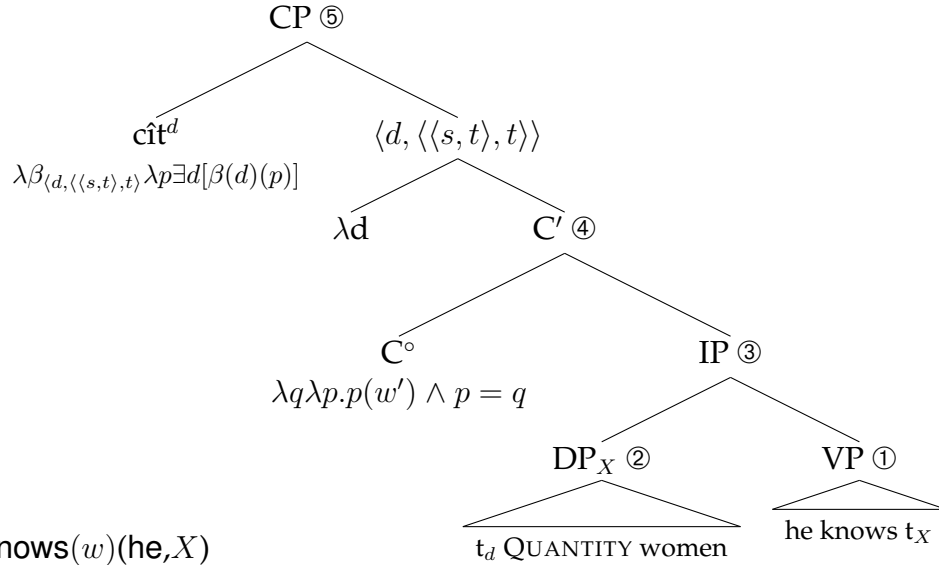
- (50) Cît-e femei cunoaște?
 QUANTUM-Fpl women know-3sg
 ‘How many women does he know?’

This sentence instantiates a quantity question in every relevant semantic sense: its felicitous answers are numbers and, when it contains a modal, it exhibits the same ambiguities discussed above in Section 2.2.1.

Given the quantity operator QUANTITY discussed above, the compositional semantics of this sentence is straightforward. Notice that the derivation in (51) doesn’t contain an instance of an *m*-word; this would not be morphologically motivated, and is unnecessary.

¹⁶Thanks to Adrian Brasoveanu and Ileana Comorovski for Romanian judgments.

(51)



- ① $\lambda X. \text{knows}(w)(\text{he}, X)$
- ② $\lambda Q \exists X [\text{women}(w)(X) \wedge Q(X) \wedge \mu(X) = d]$
- ③ $\exists X [\text{women}(w)(X) \wedge \text{knows}(w)(\text{he}, X) \wedge \mu(X) = d]$
- ④ $\lambda p. p(w^\text{Q}) \wedge p = \lambda w \exists X [\text{women}(w)(X) \wedge \text{knows}(w)(\text{he}, X) \wedge \mu(X) = d]$
- ⑤ $\lambda p \exists d [p(w^\text{Q}) \wedge p = \lambda w \exists X [\text{women}(w)(X) \wedge \text{knows}(w)(\text{he}, X) \wedge \mu(X) = d]]$

The meaning of the quantum phrase *cît* in (51) is parallel to the *wh*-operator in gradability questions (in English, the *how* in *How tall is she?*). It takes as its argument a function from a degree to a set of propositions (a question denotation), and returns a set of propositions. This gives us the right truth conditions for the Romanian quantity question, and is an especially welcome result given the fact that the *wh*-operator *cît* in Romanian is also used in gradability questions (see also Corver, 2000):

- (52) Cît de înalt-ă este?
 QUANTUM of tall-Fsg be-3sg
 'How tall is she?'

In (51), the degree d that *cît* quantifies over corresponds to the size of the set of women he knows. In a world in which the man in question knows 4 women, (51) denotes the set:

- (53) $\left\{ \begin{array}{l} \lambda w. \text{He knows 1 woman in } w. \\ \lambda w. \text{He knows 2 women in } w. \\ \lambda w. \text{He knows 3 women in } w. \\ \lambda w. \text{He knows 4 women in } w \end{array} \right\}$

I assume as before that a semantic requirement for maximal informativeness ensures that only the most informative of these answers – the proposition that he knows 4 women – is the felicitous answer. In a quantity question with a modal operator, the amount/object ambiguity follows from the position of the DP [*t_d* QUANTITY women] relative to the modal (rather than the position of *d*-many women, as in Romero 1998).

2.4.2 Multimorphemic quantum phrases in Romanian

The reason why quantity questions in the Balkan languages are of particular interest here is that they can be optionally headed by a multimorphemic quantum phrase – one composed of the *wh*-word *cît* from the quantity questions below and an *m*-word.¹⁷

- (54) *Cît de mult-e femei cunoaște?*
 QUANTUM of *m*-word-Fpl women know-3sg
 ‘How many women does he know?’

I classify *mult* as an *m*-word based on its distribution in other constructions, for instance as it occurs preminally:

- (55) *Mult-or femei le place brânz-a.*
m-word-DATpl women CL like cheese-NOM
 ‘Many women like cheese.’

¹⁷I assume the linker *de* does not contribute semantically to these expressions. Despite being homophonous, the Romanian *de* and the French *de* have the opposite syntactic distribution: Romanian requires *de* between *cît* and an adjective, but prohibits it between *cît* and an NP, where the only configuration in which French requires *de* is between *combien* and an NP. For a more thorough discussion of linkers, see den Dikken and Singhapreecha (2004); den Dikken (2006) and references therein. For an analysis of the Romanian *de* which is of particular relevance to *m*-words, see Corver (2000).

Differences in the two forms

Prima facie, the datum in (54) is compatible with a version of the DDA in which an *m*-word contributes semantically to both mono- and multimorphemic questions but is only pronounced in multimorphemic ones. If this were the case, however, the mono- and multimorphemic forms would behave identically syntactically and semantically. This is not so.

In Romanian, the accusative marker *pe* can only occur with (human) [+animate] NPs. Despite the fact that the NP complements of the quantum phrases in both questions are human, *pe* is grammatical with monomorphemic but not multimorphemic questions.

- (56) a. Pe [cît-e femei] le cunoaște?
pe QUANTUM-Fpl women CL know-3sg?
b. *Pe [cît de mult-e femei] le cunoaște?
pe QUANTUM of *m*-word-Fpl women CL know-3sg?
'How many (of the) women does he know?'

There is also a significant semantic difference between interrogatives formed with mono- and multimorphemic quantum phrases. The former, but not the latter, can be used in questions with upward-scalar predicates.

- (57) a. Cît-e ouă ajung ca să iasă prăjitura bună?
QNTM-Fpl eggs are.enough COMPL SUBJ come.out cake good
b. #Cît de mult-e ouă ajung ca să iasă
QNTM of *m*-word-Fpl eggs are.enough COMPL SUBJ come.out
prăjitura bună?
cake good
'How many eggs are sufficient so that the cake comes out good?'

So far, quantity questions in the examples here have involved downward-scalar predicates. When a predicate is downward-scalar, it is possible to infer from the fact that a set *X* is in its denotation to the fact that a subset of *X* is also in its denotation. Upward-scalar predicates, on the other hand, allow inference only from the

set X to its superset. In terms of gradable predicates P and Q , a downward-scalar predicate allows inference from ' X is P to degree d' ' to ' X is P to degree d_n , $d_n < d'$ ', while an upward-scalar predicate allows inference from ' X is P to degree d' ' to ' X is P to degree d_m , $d_m > d'$ '.

Background on questions with upward- and downward-scalar predicates

The distinction between downward- and upward-predicates has been discussed in the context of quantity questions with respect to the notion of maximality (Rullman, 1995; Dayal, 1996; Beck and Rullman, 1999). As I've already discussed, in inquiring *How many children does Joe have?*, the speaker is asking about the maximal number of children Joe has. It would be misleading to answer this question – under normal circumstances – with the proposition *Joe has 2 kids* in a world in which he (also) has 5 kids. This has led some to posit an overt maximality operator in the denotation of a question (Rullman, 1995). The effect of this operator is to restrict the denotation of a question to the maximal answer: instead of asking, 'What is an amount d of children that Joe has?', an interrogative with a maximality operator asks, 'What is the highest amount d of children that Joe has?'

However, if *how many* did in fact mean 'what is the highest d ,' then the quantum phrase would be incompatible with questions with upward-scalar predicates. Downward-scalar predicates are the only ones for which the most informative answer coincides with the answer which provides the maximal degree. For questions with upward-scalar predicates, like *How many eggs are sufficient to bake a cake?* and *How much money can a graduate student live on?*, the most informative answer is the one which provides the *minimal* or lower degree.

Take the interrogative *How much money can a graduate student live on?*. Let's say that a graduate student can live on \$20,000, but not \$19,000. Of course this means that a graduate student can live on \$25,000 or \$250,000 or any number larger than

\$20,000. Then the most informative answer is 'A graduate student can live on \$20,000.' However, \$20,000 is not the highest amount of money on which a graduate student can live: there *is* no highest amount of money on which a graduate student can live.

These considerations have led Dayal (1996) and Beck and Rullman (1999) to abandon the idea that questions involve a maximality operator. They instead suggest that the infelicity of answers like *Joe has 2 kids* to the question *How many kids does Joe have?* in a scenario in which Joe has 5 kids is the result of a general semantic requirement that a question denotes its most informative answer.

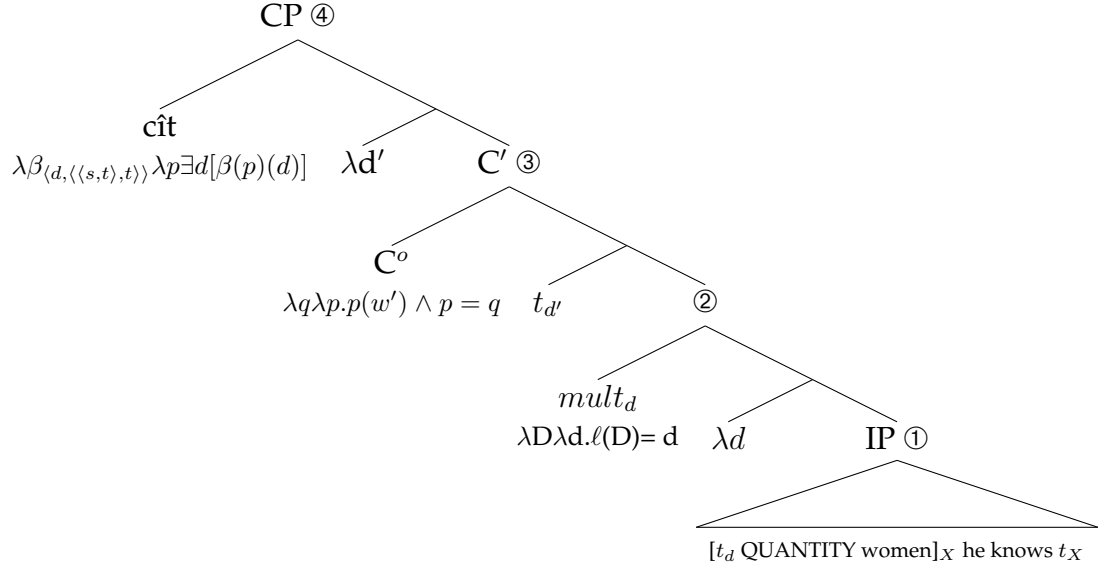
Importantly, *cît de mult* questions exhibit the precisely the kind of behavior that Dayal (1996) and Beck and Rullman (1999) attribute to questions with maximality operators: they are incompatible with upward-scalar questions. This at first suggests that *mult* is a maximality operator. But this is an unattractive suggestion; it would prevent a unified analysis of the semantics of *m*-words across the constructions in which they occur, even within Romanian. The prenominal construction (55) has the same truth conditions as its English counterpart *Many women like cheese*, which is to say, it does not involve a maximality operator (it does not mean anything like 'The largest amount of women like cheese').

A compositional semantics

It turns out that the semantics of quantity questions and *m*-words proposed in (46) is sufficient to account for the facts above. *M*-words are not maximality operators, but when they occur in a quantity question they achieve a similar result. An *m*-word denotes a function from a set of degrees to a singleton set that is the measure of that set. For an interrogative with a downward-scalar predicate, the measure of the set is always the same as the maximum degree in the set. But for an interrogative with an upward-scalar predicate, this is not the case. To demonstrate this,

I'll first provide a compositional semantics of multimorphemic quantity questions and then discuss an example.

(58)



- ① $\exists X[\mathbf{women}(w)(X) \wedge \mathbf{knows}(w)(\mathbf{he}, X) \wedge \mu(X) = d]$
- ② $\lambda d'.\ell(\lambda d\exists X[\mathbf{women}(w)(X) \wedge \mathbf{knows}(w)(\mathbf{he}, X) \wedge \mu(X) = d]) = d'$
- ③ $\lambda p.p(w^\circ) \wedge p = \lambda w.\ell(\lambda d\exists X[\mathbf{women}(w)(X) \wedge \mathbf{knows}(w)(\mathbf{he}, X) \wedge \mu(X) = d]) = d'$
- ④ $\lambda p\exists d'[p(w^\circ) \wedge p = \lambda w.\ell(\lambda d\exists X[\mathbf{women}(w)(X) \wedge \mathbf{knows}(w)(\mathbf{he}, X) \wedge \mu(X) = d]) = d']$

The question in (58) is similar to the one in (51), differing only in that it contains an *m*-word. Just as in (51), the set of degrees *d* correspond to sizes of the plurality *X*. Differently from (51), *d* is not bound existentially by the *wh*-operator *cît*. Instead, the set of degrees *d* function as the argument of *mult*, whose corresponding value is the singleton set of degrees *d'*. This is the degree that gets bound existentially by *cît*.

In a world in which Joe knows 4 women, the set of degrees *d* is {1,2,3,4}. This set becomes the argument of *ℓ*, whose value is the set of degrees *d'* corresponding to the measure of its argument: {4}. It's *d'* which is bound by the *wh*-operator in (58), resulting in the singleton set of propositions { λw .The size of the set of quantities of women he knows in *w* is 4}.

We get the same result for a question involving mass nouns (for instance, a question about how much pizza dough Joe bought, headed by *cît de mult*). In a scenario in which Joe bought 2lbs. of pizza dough, the argument of the *m*-word is the set of degrees d with an open lower bound of 0 and a closed upper bound of 2: $\{\dots, 5\text{lbs.}, \dots, 1\text{lb.}, \dots, 1.5\text{lbs.}, \dots, 2\text{lbs.}\}$. Its value is the set of degrees d' corresponding to the measure (ℓ) of its argument, the upper bound 2lbs. minus the lower bound 0, or $\{2\text{lbs.}\}$.

How does a question about the size of the set of quantities of women result in information about the quantities of women, which is what *mult* questions seem to inquire after? Given that the predicate in (58) is downward-scalar, the size of the set of amounts of women-he-knows will always be the same as the maximum amount of women-he-knows. This means that there is a one-to-one correspondence between the answer to a *cît* question ('The amount of *X*s...') and the answer to a corresponding *cît de mult* question ('The size of the set of amounts of *X*s...'). In questions with downward-scalar predicates, the hearer can always infer from one to the other.

Questions formed with upward-scalar predicates differ from those formed from downward-scalar predicates. This difference is illustrated below (Figure 2.4 is repeated from Figure 2.2, which was used to illustrate the domain of *m*-words and the meaning of the measure ℓ .)

FIGURE 2.4: Downward-scalar predicate $\lambda d \exists X [P(X) \wedge Q(X) \wedge \mu(X) = d]$

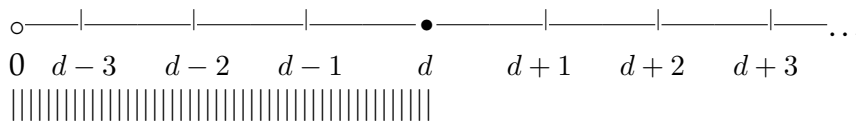
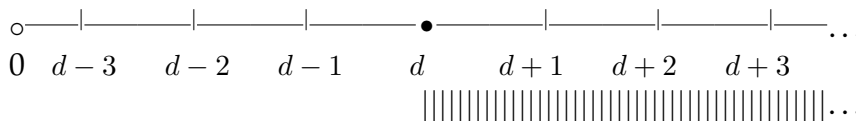


FIGURE 2.5: Upward-scalar predicate $\lambda d \exists X [P'(X) \wedge Q'(X) \wedge \mu(X) = d]$



The measure ℓ of a set of degrees d corresponding to a downward-scalar predicate is equivalent to the maximum d in the set. In measuring a set of degrees d corresponding to an upward-scalar predicate, however, ℓ is computing the measure of a bounded interval, one which has a lower bound of d and an upper bound of ∞ . The size of the sets of degrees corresponding to all upward-scalar predicates is always the same given the definition of ℓ in (41): ∞ . It is clearly not the case, then, that we can infer from the answer of a *cît* question formed from an upward-scalar predicate to the answer of a corresponding *cît de mult* question.

What's more, because the denotation of all *cît de mult* questions formed with upward-scalar predicates will always be the same – the singleton set of propositions $\{\lambda w. \text{The size of the set of quantities of } x \text{ which are } P \text{ and } Q \text{ in } w \text{ is } \infty\}$ – they are entirely uninformative. And because the denotation of every *cît de mult* question with an upward-scalar predicate will always be the same in any world for any pair of predicates, and so the question ceases to be information-seeking. Assuming that a question which is not information-seeking is an unacceptable question (Aqvist, 1965; Groenendijk and Stokhof, 1984, p. 57-8), this is what results in the unacceptability of (57b).¹⁸

To sum up: the definition of *m*-words as degree modifiers in (46) was initially proposed to account for the behavior of these terms as differential modifiers in comparatives. I've argued that it can be extended to account for instances of *m*-words prenominaly. In this section, I've also argued that it can also be extended to account for the differences between quantum phrases with *m*-words and quantum phrases without *m*-words, in languages in which this alternation is optional.

¹⁸Rhetorical questions are a notable exception to this generalization: they are never information-seeking but are nevertheless felicitous. But rhetorical questions demonstrate a very particular semantics and intonational patterns (Sadock, 1971, 1974; Han, 2002) which make them more assertive than interrogative in nature.

Non-scalar questions

Beck and Rullman (1999) discuss another type of question as being incompatible with a maximality operator: non-scalar ones. The examples they present are these:

- (59)
- a. How many people can play this game?
 - b. How many people can form a soccer team?
 - c. How many processors can Windows NT support?

As the authors explain, “A complete answer to [(59a)] could be, for instance, ‘between 4 and 6’. Or a certain game may be played with any even number of players. [...] In [(59c)], for instance, the true answers (we are assured by Thilo Goetz, p.c.) are 1, 2, and 4” (p. 258). These types of questions, they argue, are incompatible with a maximality operator because the most informative answer is one which lists all possible degrees d , not just the maximal degree.

Beck and Rullman (1999) suggest that these types of questions are formed “with non-scalar predicates,” while other types of questions are formed with downward- or upward-scalar predicates. But this way of discussing the questions in (59) is misleading in an important way. The questions in (59) are actually all formed with *downward-scalar predicates*: under normal circumstances (unless we have reason to believe otherwise), we would typically infer from the fact that Windows NT can support 4 processors to the fact that Windows NT can support 3 processors and 2 processors, etc. This means that it is world knowledge (about rules of soccer or operating systems) or linguistic context which turns a question formed with a downward-scalar predicate into a non-scalar question.

The same goes for questions formed with upward-scalar predicates, like the one discussed above, repeated in (60).

- (60) How much money can a graduate student live on?

We would typically infer from the fact that a graduate student can live on \$20,000 to the fact that he can live on \$21,000 (and any amount of money in between) and so on, to infinitely much money. However, if you were asked the question in (60) immediately after hearing of a new law that anyone making precisely \$30,000 will be shot, you would realize that it would be unwise to infer from the fact that a graduate student can live on \$29,000 to the fact that a graduate student can live on \$30,000, and you would change your answer accordingly.

This suggests that there is no such thing as a ‘non-scalar predicate,’ and that, to the extent that the questions in (59) receive non-scalar readings, it is a pragmatic effect, not a semantic one. Under this view, non-scalar questions are questions formed with either upward- or downward-scalar predicates whose domain has been restricted pragmatically.¹⁹ This generalization is impacted by the observation that the distribution of non-scalar interpretations of questions is relatively restrictive. All of the examples presented here, for instance, whether upward- or downward-scalar, contain the modal *can* (and I cannot think of an instance of a non-scalar question which does not).

Returning to the distribution of *cît de mult* phrases, we thus would expect a question to behave *semantically* just as a question formed from the same predicate in a different context, but expect it to differ pragmatically, in terms of which possible answers in fact form appropriate responses. This is in fact the case: Romanian non-scalar multimorphemic quantity questions formed with downward-scalar predicates are acceptable, and Romanian non-scalar multimorphemic questions formed with upward-scalar predicates are unacceptable. Below is an example of the former.

¹⁹There is an obvious parallel here to quantifier domain restriction in the individual domain, as in *Lou won every contest*. An account of *how* the denotation of a question can be restricted pragmatically presumably runs into the same compositionality problem as an account of how the denotation of a QP is restricted; I have no solution here.

- (61) Scenario: A basketball team can consist of 4, 5 or 7 players.
- a. Ion știe câți jucători pot forma o echipă de baschet.
 J know-3sg QNTM-Mpl players can-3pl form a team of b-ball
- b. Ion știe cât de multi jucători pot forma o echipă
 J know-3sg QNTM of *m*-word-Mpl players can-3pl form a team
 de baschet.
 of basketball
 'John knows how many players can form a basketball team.'

The preferred answer for both of the questions in (61), given the preceding linguistic context, is *4, 5 or 7*. Besides the complications to the compositionality of non-scalar questions mentioned in footnote 19, it is additionally not clear how the denotation of a downward-scalar *cât de mult* question can result in this answer.

This subsection has provided an account of Romanian quantity questions formed with multimorphemic quantum phrases whose compositional semantics involves an *m*-word as well as a *wh*-operator. Because it measures the size of a set of degrees, an *m*-word behaves like a maximality operator. This has no effect on the meaning of a question formed with a downward-scalar predicate, but it renders any question formed with an upward-scalar predicate uninformative, and therefore unacceptable.

Non-scalar questions require more extensive study; I have suggested here that e.g. (61b) is acceptable because its non-scalarity is pragmatically derived from its downward-scalar denotation. But a satisfactory account of *cât de mult* questions requires explanations for how this derivation works.

The rest of this section discusses other differences between *cât* and *cât de mult* questions.

The object/amount ambiguity

Expressions with mono- and multimorphemic quantum phrases differ in ways other than their compatibility with questions with upward-scalar predicates: as

(56), repeated in (62) shows, only monomorphemic quantum phrases can occur with the marker *pe*.

- (62) a. *Pe cîte femeii le cunoaşte?*
pe QUANTUM-Fpl women CL know-3sg?
 b. **Pe cât de multe femeii le cunoaşte?*
pe QUANTUM of many-Fpl women CL know-3sg?
 'How many (of the) women does he know?'

Although there is a potential syntactic explanation for this contrast, the ungrammaticality of (62b) actually follows from two independent semantic facts: 1) a quantity question with *pe* can only receive an object interpretation, and 2) multi-morphemic quantity questions can only receive an amount interpretation.

Pe is an accusative preposition in Romanian which marks either definiteness or specificity in the sense of Enç (1991) (Dobrovie-Sorin, 1992). It occurs obligatorily with definite NPs, proper names, strong pronouns, overt definites and universal quantifiers. It is optional with indefinites, but marks specificity when it occurs with them (this example is number (32) from Bende-Farkas, 2002).

- (63) a. *Ion iubeste o actrite.*
 John love-3sg an actress
 'John loves an actress.'
 b. *Ion iubeste pe o actrite.*
 John love-3sg *pe* an actress
 'John loves a certain actress.'

As mentioned above, quantity question formed with *pe* can only receive an object reading.

- (64) a. *Cîte femeii vrea sa le angajeze?* *ambiguous*
 QUANTUM-Fpl women want-3sg she CL hire-3sg
 b. *Pe cîte femeii vrea sa le angajeze?* *unambiguous*
pe QUANTUM-Fpl women want-3sg she CL hire-3sg
 'How many women does she want to hire?'

Recall from the discussion surrounding (56) that *pe* can only occur with [+animate] NPs. This, plus the fact that *pe* marks for specificity, predicts that a quantity question with *pe* can only have an object reading. If Mary wants to hire a specific group of women, then it is not the case that there is an amount of women *d* such that she wants to hire *d* women. In a context in which there *is* an amount of women *d* such that Mary wants to hire *d* women, compatible with the amount reading, *pe* could not be used because it would not be associated with a [+animate] NP.

Second, multimorphemic questions can only receive an amount reading.

- (65) a. *Cîte femeii vrea să le angajeze?* *ambiguous*
 QNTM-Fpl women want-3sg she CL hire-3sg
 b. *Cît de multe femeii vrea să le angajeze?* *unambig*
 QNTM *de m*-word-Fpl women want-3sg she CL hire-3sg
 'How many women does she want to hire?'

While the *cît* question in (65a) is ambiguous like its English *how many* counterpart, the *cît de mult* question in (65b) is unambiguous: it can only be used to ask about an amount *d* such that Mary decided to hire *d* women.

There seems to be an obvious connection between the truth conditions of *cît de mult* questions (presented in (58)) – the fact that they denote singular degree propositions, where the degree is a measure of amounts, rather than individuals – and the amount reading. However, at this time I have no explicit account for why this is so.

The semantics in (58) offer insight into another empirical difference between mono- and multimorphemic quantity questions in Romanian. Imagine a scenario in which A and B are looking at a picture of all of the children who attend some primary school. There are so many children in the picture that it is clearly impossible to count them all, but A wants some idea of the number of children in the picture. In such a situation, the quantity question *How many children are in the picture?* is an inexact question, looking for an estimate rather than a precise answer. As it turns

out, *cît* questions are felicitous as inexact questions, while *cît de mult* questions are not. This seems relatable to the fact that *cît* questions, in these situations, denote a great many alternatives, some of which B knows to be true, and some of which B doesn't know to be true. As a result, he can identify at least some alternatives as true. *Cît de mult* questions, on the other hand, have only one true answer, and B, in this case, doesn't know which one it is. This explanation requires a more explicit theory of questions in discourse to supplement the semantics I've proposed here, but seems to me intuitive.

2.5 Other instances of *m*-words

Section 2.3 proposed a definition of *m*-words as degree modifiers and demonstrated how this definition works compositionally in sentences with pre-nominal *m*-words. Section 2.4 supported this analysis of *m*-words by appealing to Balkan languages in which these *m*-words are essentially optional in quantity questions, but come with subtle effects. This last section reviews the compositional semantics of *m*-words as degree modifiers in other constructions in an attempt towards a unified semantics for all instances of *m*-words.

2.5.1 Quantity questions in English

In discussing quantity questions in Romanian, I ignored quantity questions in English. This is because the morphology of English quantum phrases is misleading: like Romanian multimorphemic quantum phrases, they consist morphologically of a *wh*-operator and an *m*-word. However, if this *m*-word were contributing semantically to the derivation of an English quantity question, *how many* questions in English would function the same way that *cît de mult* questions do.

In other words: we've observed the special properties of a quantity question

with a semantically contentful *m*-word, and have attributed these properties to the (independently-motivated) definition of an *m*-word. A quantum phrase whose *m*-word contributes to its denotation: 1) is incompatible with questions with upward-scalar predicates; and 2) can only receive an amount reading. We already know that these properties don't hold of English *how many* questions. English quantity questions pattern instead with *cît* questions in being ambiguous and compatible with questions with both upward- and downward-scalar predicates.

It seems clear, then, that although quantum phrases in English contain a morphological token of an *m*-word, this morpheme does not contribute to the semantics of the sentence. This is the opposite claim than that made by DDA proponents, who draw semantic conclusions from the morphological observations made in Bresnan (1973). These theorists take the *m*-word in *how many* to play an important role in the semantics of quantity questions in English.

Because quantity questions in English have the same semantics as *cît* questions in Romanian, we can compute their denotations along the lines of (51). In this analysis, quantity questions in English contain the null quantity operator QUANTITY, and quantum phrases in English provide existential quantification over degrees, just as the English *how* in gradability questions like *How tall is Joe?*. The only notable semantic difference between *how many* and *how* in English, under this account, is that the former binds degrees of quantity, while the latter binds degrees of gradability.

2.5.2 Prenominal *m*-words and van Benthem's Problem

Another interesting consequence of this characterization of *m*-words is that it provides a response to what has been called "van Benthem's Problem" (van Benthem, 1986, pp. 52–53).²⁰ Take the sentences in (66).

²⁰Thanks to Roger Schwarzschild for bringing this to my attention.

(66) Many students attended. \nrightarrow Few students attended.

Imagine a situation in which 30 students on average attend classes, but 50 students attend the class under discussion. In this situation, the *many* sentence in (66) is true, but the *few* sentence is false. However, the truth conditions in (68) – assigned to the sentence *Few students attended* by the DDA – are true in this scenario.²¹

(68) $\exists X[\text{students}(X) \wedge \text{attended}(X) \wedge \mu(X) < d, d > s_{few}]$

Specifically, there is *some* plurality of students in this scenario who attended and whose number is smaller (larger on the ‘few’ scale; see Chapter 3 for a detailed explanation) than the ‘few’ standard in this scenario.

This is a problem for any theory of indefinites with decreasing quantifiers, as Hackl (2000) points out (see also the discussion of *The guests were three girls* in Landman, 2000). A typical solution to the problem is to posit a maximality operator in the meaning of negative-polar *m*-words which restricts the plurality quantified over in (68) to the maximum plurality.

The degree modifier approach above, which employs a quantity operator and an *m*-word as a measure of sets, side-steps this problem in the same way it accounts for the Romanian data. The form in (69a) is assigned the truth conditions in (69b).

(69) a. Few students attended.
 b. $\exists d'[d' = \ell(\lambda d \exists X[\text{students}(X) \wedge \text{attended}(X) \wedge \mu(X) = d]) \wedge d' > s_{few}]$

²¹Neither Romero (1998) nor Hackl (2000) encode in *many* the ‘greater than a standard’ component of its meaning in prenominal environments (essentially because this meaning seems divorced from *many* in expressions with *how many* and *more*, the respective objects of their studies). Let’s assume that this meaning comes about in a DDA account the same way I’ve been assuming it does here (and in the way discussed in Chapter 3), despite the lack of parallels between a DDA meaning of *many* and gradable adjectives. Neither author provides an explicit meaning for *few*, but I think it is consistent with the spirit of the DDA account to assume that *many* and *few* have the following meanings, respectively, in an account of prenominal *m*-words consistent with the DDA.

(67) a. $[[\text{many}]] = \lambda d \lambda P \lambda Q \exists x[|x| = d \wedge P(x) \wedge Q(x)] \wedge d > s_{many}$
 b. $[[\text{few}]] = \lambda d \lambda P \lambda Q \exists x[|x| = d \wedge P(x) \wedge Q(x)] \wedge d > s_{few}$

The argument of the *m*-word is the set of all quantities of pluralities of students who attended, and so its value is the size of that set of quantities. The result – after existential closure and the evaluativity comparison of *d'* to a contextual standard – holds that *Few students attended* is true only if the size of the set of quantities of students who attended is small relative to a contextual standard. Given that the size of the set of quantities of students who attended is the same as the size of the maximum plurality of students who attended, we sidestep van Benthem's Problem.

2.5.3 *M*-words and determiners

As I discussed in Section 2.1.1, one property of *m*-words that sets them apart from determiners is their ability to occur with an overt determiner.

- (70) a. The many guests brought gifts.
b. These few students have managed to excel in the class.

However, *m*-words can only occur with definite determiners.

- (71) a. *Several many guests brought gifts.
b. *All many guests brought gifts.
c. *Some many guests brought gifts.

Recall that these data are also a problem for DDA accounts, because an analysis in which *m*-words are determiners predicts – in the absence of an additional explanation – that the forms in (74) will be ungrammatical just like quantifier phrases headed by **The all... are*.

The account presented here analyzes *m*-words instead as degree modifiers, and so instead needs to account for the unacceptability of the data in (71). I'll reproduce the truth conditions from the prenominal *m*-word sentence in (42), and we'll proceed from there.

- (72) a. Many linguists ate pizza.
 b. $\lambda d'.\ell(\lambda d\exists X.\text{linguists}(X) \wedge \text{ate}(X,\text{pizza}) \wedge \mu(X) = d) = d'$
 c. $\exists d'[\ell(\lambda d\exists X.\text{linguists}(X) \wedge \text{ate}(X,\text{pizza}) \wedge \mu(X) = d) = d' \wedge d' > s]$

Recall that the denotation in (72b) reflects the meaning of the sentence in (72a) before the degree argument d' is bound via existential closure, and before considerations of evaluativity. The truth conditions in (72c) include these aspects of the sentence's meaning.

“Stacked determiner” constructions like (70a) present a problem for proponents of the DDA, who assume that both *the* and the *m*-word provide existential quantification over the individual x (resulting in vacuous quantification in the other examples in (74)).

In the present analysis of (72), the *m*-word is a relation between sets of degrees. This means that the presence of an overt determiner isn't necessarily incompatible with the presence of an *m*-word. But a problem remains: what is the role of determiners in prenominal *m*-word constructions? And why are they restricted to definites?

Of particular interest is the difference in presupposition between the two constructions in (73):

- (73) a. Many linguists ate pizza.
 b. The many linguists ate pizza.

Specifically, (73b) presupposes that there is one unique group of linguists (who happen to be many in number), whereas (73a) carries no such presupposition. This is reminiscent of presuppositions in other *the* constructions, which suggests an analysis in which *the* in *m*-word constructions is as similar to its standard meaning as possible.

Recall that the current analysis postulates that individual quantification in these constructions is provided by the null quantity operator QUANTITY, which also

measures the size of an individual. It seems that in expressions like (73b), *the* could be performing a similar function, but (a) overtly, and (b) with an additional uniqueness presupposition (i.e. parallel to the difference between *some* and *the*).

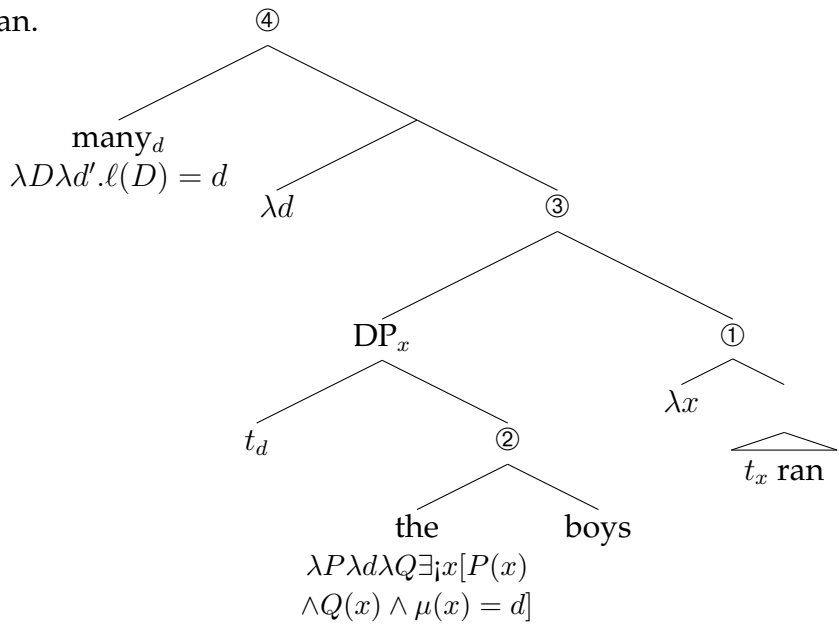
This characterization of this meaning for *the* is in (74):

$$(74) \quad \llbracket the \rrbracket = \lambda P \lambda d \lambda Q \exists_i x [P(x) \wedge Q(x) \wedge \mu(x) = d]$$

Where $\exists_i x [F(x)]$ asserts $\exists x [F(x)]$
and presupposes $\forall x \forall y [(F(x) \wedge F(y)) \rightarrow x = y]$

The idea is that, while the null morpheme QUANTITY is the quantity-operator version of indefinite determiners, the overt morphemes *the* and *these*, etc. function as quantity-operator versions of definite determiners. This account, while it covers the English data, predicts that languages can vary in terms of whether their quantity operators are encoded in covert or overt morphemes. It is not at this time clear to me whether this is a correct prediction.

(75) The many boys ran.



- ① $\lambda X. \text{ran}(X)$
- ② $\lambda d \lambda Q \exists X_i [\text{boys}(X) \wedge Q(X) \wedge \mu(X) = d]$
- ③ $\exists X_i [\text{boys}(X) \wedge \text{ran}(X) \wedge \mu(X) = d]$
- ④ $\lambda d' . \ell(\lambda d \exists X_i [\text{boys}(X) \wedge \text{ran}(X) \wedge \mu(X) = d]) = d'$
- ⑤ $\exists d' [\ell(\lambda d \exists X_i [\text{boys}(X) \wedge \text{ran}(X) \wedge \mu(X) = d]) = d' \wedge d' > s]$

The obvious problem with an account which analyses *the* as an overt counterpart to QUANTITY is one of word order. Specifically, in derivations of *m*-word constructions in e.g. (42), QUANTITY must be interpreted before the *m*-word, for type reasons (it is QUANTITY which allows for the *m*-word to take a set of degrees as its argument). Because of their similar meanings, the same must go for *the*. While the fact that QUANTITY is null prevents us from knowing where in the linear order it is pronounced, it is clear that *the* is pronounced before the *m*-word. It is not clear to me why this must be the case.

This characterization of *the* extends to measure phrase (MP) (76) and numeral constructions(77):

- (76) a. Karen ate 2lbs. of cheese.
- b. Karen ate the 2lbs. of cheese.
- (77) a. Two dogs ran into the street.
- b. The two dogs ran into the street.

Given an analysis of MPs as measures of sets of degrees (von Stechow, 1984a; Zwarts, 1993; Schwarzschild, 2005), this parallel is expected. While (76a) describes a situation in which Karen ate 2lbs. of cheese, (76b) has an additional presupposition that the cheese she ate – while weighing 2lbs. – was the only chunk of cheese around.

In sum: unlike the DDA, the degree modifier approach to the semantics of *m*-words does not predict that *m*-words and determiners cannot cooccur. However, it does require an additional explanation of the meaning *the* contributes to an expression and how. I have made the suggestion above that *the* is an overt counterpart of the quantity operator QUANTITY, which accounts for the difference in meaning between e.g. the sentences in (73), but requires an explanation of the surface word-order of constructions like *The many linguists ate pizza*. To the extent that such an explanation is available, this account extends easily to MP and numeral

constructions, which I argue also contain either QUANTITY or *the*.

2.5.4 Where *m*-words *can't* occur

Because the DMA defines the argument of an *m*-word semantically – in terms of a set of degrees – it predicts they can occur in a variety of syntactic contexts. And because it analyzes them as degree modifiers of type $\langle\langle d, t \rangle, \langle d, t \rangle\rangle$, it predicts that they can occur in a degree construction without effecting the sentence's type, which makes them optional in theory in almost any degree construction.

As we've seen, *m*-words are pretty ubiquitous. However, there is one environment from which they are prohibited: before adjectives. I'll refer to this as the 'Pre-adjectival Restriction'.²²

(79) *Adam is much tall.

The Pre-adjectival Restriction was first observed by Bresnan (1973), who stipulated a rule that deletes *m*-words before adjectives in the surface structure. Doetjes (1997) examines the Pre-adjectival Restriction crosslinguistically and accounts for (3) as follows: 1) *much* and *very* mean the same thing, but *very* has the specified purpose of modifying adjectives; and 2) the 'Elsewhere Condition' prevents the use of a morpheme for a given purpose if a more specific one exists. If it is as general as Doetjes proposes, the Elsewhere Condition runs into problems for many other sentences in which specific/general alternations are acceptable, e.g. the pre-adjectival

²²Slavica Kochovska has informed me that Macedonian is an exception to this generalization.

(78) Taa e (moshne) mnogu visoka.
she is-3sg (very) *m*-word tall-3fm
'She is (very) much tall.'

It is especially tempting to analyze *mnogu* as an *m*-word because it is optional in quantity questions (just as in Romanian): a quantum phrase in Macedonian consists of the *wh*-phrase *kolku* and an optional *mnogu*. (And a quantum phrase in Bulgarian consists of the *wh*-phrase *kolko* and an optional *mnogo*, although *mnogo* in Bulgarian cannot occur preadjectivally.) It's not clear to me what it is about Macedonian that accounts for this exceptional property of *kolku*.

well/very alternation in British English.

An alternative explanation comes from Kennedy and McNally (2005) and Kennedy (2007) and is based on the distribution of the modifiers *very*, *well* and *much* in English. It starts with the observation that *much* can in fact modify *some* adjectives; these tend to be deverbal.²³

- (80) a. She took his much needed advice.
b. The gifts were much appreciated.

The authors observe that the distribution of *very*, *well* and *much* is contrastive, and account for this distribution by appealing to the properties of the scales associated with each adjective. They assume, as I have been, that these scales are a composite of three properties: the direction of measurement (positive or negative, the difference between *tall* and *short*), the dimension of measurement (the difference between *tall* and *wide*), and scale structure. In particular, they focus on whether or not a scale is open (lacks a minimal element, a maximal element, or both) or closed (has both minimal and maximal elements).

They observe that, although *very*, *well* and *much* seem synonymous, there are restrictions on the structure of the scales they can modify.

- (81) a. *much* modifies adjectives whose scales have minima
b. *very* modifies adjectives whose scales have neither minima nor maxima
c. *well* modifies adjectives whose scales have both minima and maxima

Kennedy and McNally present several tests for scale structure, some of which are below.

- (82) OPEN SCALES
a. ??perfectly/??slightly tall
b. ??perfectly/??slightly short
(83) LOWER/UPPER CLOSED SCALES
a. ??perfectly/slightly dirty
b. perfectly/??slightly clean

²³Bresnan (1973) additionally observed that *much similar* and *much different* are possible.

- (84) CLOSED SCALES
 a. perfectly/slightly opaque
 b. perfectly/slightly transparent

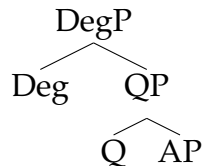
The Kennedy/McNally analysis provides an explanation for the Pre-adjectival Restriction which is independent of the meaning of *m*-words proposed here: accounting for the distribution of *m*-words requires modifying their definition to reference the structure of the scale of their arguments.

There is one final instance of *m*-words which needs to be addressed: those characterized in Corver (1997) as ‘*much*-support.’ Corver modifies Bresnan’s syntactic analysis of *m*-words, suggesting that rather than employing a process of *much*-deletion before adjectives, English has something called ‘*much*-support’ (a parallel to *do*-support in the adjectival domain). This is based on the observation that *much* cannot cooccur with a Deg-head modifying an adjective, but it must do so when preceding the proadjective *so*.

- (85) a. John is too (**much*) intelligent.
 b. Mary is intelligent, but John is too *(*much*) *so*.

Corver (1997) analyzes the phrase structure of a DegP as follows:

- (86) Corver’s (1997) Degree Phrase:



The Deg° must select a QP, which in turn selects the AP. Adjectives like *intelligent* are base-generated in A° but must move to Q° to receive a theta-role discharged by the Deg-head. This is what happens in (85a). To account for (85b), Corver analyses *so* as a pro-form AP which is unable to raise to Q°. He suggests that, in such an instance, Q° can instead be filled by ‘dummy’ *much* (as a last resort).

This analysis of (85b) amounts to suggesting that the *m*-words in these sen-

tences do not contribute semantically to its truth conditions. We have independent evidence of such a phenomenon in English from observing the syntactic and semantic properties of English quantity questions. Whether or not Corver's analysis is correct, there is enough reason to believe that the presence of *much* in these sentences has no semantic motivation or import.²⁴

2.6 Conclusion

M-words occur in a wide variety of constructions: prenominally (with or without overt definite determiners), as part of the comparatives like *fewer*, as differentials in comparatives, and in quantum phrases. The goal of this chapter has been to provide a single semantic value for *m*-words that can correctly account for the truth conditions of sentences that have *m*-words contributing to their compositional semantics.

I have advocated a definition of *m*-words based on their behavior as differentials in comparatives. I characterized them as degree modifiers, functions from a set of degrees d to the singleton set of degrees d' which is the size of the set of ds . In prenominal environments, *m*-words assign the set of quantity degrees associated with a set of individuals the measure d' . When there is no overt determiner, d' is bound via existential closure. When there is an overt determiner (like *as* or *too*), it binds d' .

When *m*-words occur in quantum phrases – like in Romanian *cît de mult* questions – the resulting quantity question is compatible with questions formed with downward-scalar predicates but not upward-scalar predicates. I show that this is directly attributable to a degree modifier account of *m*-words.

There are a few environments in English in which *m*-words appear to be se-

²⁴Although see Neeleman et al. (2004) for arguments that Corver's syntactic assumptions aren't entirely correct.

mentally vacuous. Following Corver (1997), I have analyzed these appearances of *m*-words as instances of ‘*much*-support’. I have departed from Corver in extending this phenomenon to the *m*-words in quantum phrases in English.

This is not of course a comprehensive study of all instance of *m*-words; I have not, for example, discussed sentences like *Many a graduate student has incompletes*. Kayne (2002) presents a syntactic account of the restrictions of this sentence. It’s clear that *m*-words have a wide and complex distribution, and I argue here that this distribution and the meaning of *m*-words – when detectable – is best explained by analyzing *m*-words as degree modifiers. As a result, any instance in which *m*-words contribute semantically to a sentence is an instance in which they are functions from a set of degrees to its measure. However, more work needs to be done to provide a thorough explanation of instances of *m*-words in which they don’t appear to make a semantic contribution.

CHAPTER 3

Evaluativity and Degree Modification

3.1 Introduction

The previous chapter presented an example of a natural language degree modifier. Because *m*-words are phonologically overt, it's relatively easy to tell whether a given form contains an *m*-word or not (although English demonstrated that it is not as easy as it could be).

This chapter identifies another natural language degree modifier, but one which is phonologically covert.¹ We can infer the presence of this degree operator in a given degree construction from the meaning of the construction: particularly, from knowing whether or not it is evaluative. A degree construction is **evaluative** if it makes reference to a degree which exceeds a contextually valued standard.

Evaluativity is typically associated with 'positive constructions,' examples of which are in (1).

- (1) a. Lou is tall.
b. Sue is a tall cook.

¹This chapter is an expansion of work in Rett (2008).

A positive construction contains a gradable predicate but no accompanying overt degree morphology. So although (1a) is a positive construction, the corresponding *Lou is 5ft tall* is not (it's a measure phrase (MP) construction).

Both of the forms in (1) are evaluative. For (1a) to be true, it is not sufficient that Lou is tall to any degree d ; this would make any statement of the form in (1a) – when the subject is a 3-dimensional object – trivially true. Instead, for (1a) to be true, Lou needs to be tall to a degree which exceeds a standard of tallness: he needs to be significantly tall. The same is true for the attributive form in (1b): for it to be true, Sue's height needs to exceed a standard of tallness, she needs to be tall to a relatively high degree.

There are two points to be made about the standards invoked by evaluative forms like those in (1) before we continue a study of evaluativity itself. The first is that they vary with context: assuming Lou is 6-ft tall, (1a) could very well be true in a situation in which we are discussing e.g. linguists. But, holding fixed Lou's height, (1a) is likely to be false in a context in which we are discussing professional basketball players, who are much taller on average than linguists.

The second point – demonstrated by (1b) – is that even though (1a) indicates that the standard receives its value from context, the value of a standard has strong ties with linguistically encoded information in the sentence. In particular, it is hard to imagine a situation in which (1b) can be used to assert that Sue is tall for anything but a cook (a woman, say). This complicated interplay of semantics and pragmatics is not restricted to evaluativity (see Rett, 2006a, for a discussion of a similar problem with respect to quantifier-domain restriction) and is discussed at length with respect to gradable adjectives in Katz (1972); Bartsch and Vennemann (1972); Siegel (1977); von Stechow (1984a); Ludlow (1989); Kennedy (2007).

The goal of this chapter is to provide an account of the distribution of evaluativity: which degree constructions are evaluative and why. I will argue that

evaluativity is pervasive in degree constructions, encoded by a degree modifier EVAL, and that its distribution is conditioned by a combination of two features: the polarity of the predicate in the sentence (e.g. *short* vs. *tall*) and the nature of the degree quantifier in the sentence (e.g. the comparative *-er* vs. the equative *as*).

The outline of this chapter is as follows: Section 3.2 describes previous accounts of the distribution of evaluativity, in which evaluativity is intrinsically linked to the positive construction. Section 3.3 provides a new perspective on the distribution of the semantic property of evaluativity and Section 3.4 proposes a corresponding account of how evaluativity is encoded. Section 3.5 extends the account to a wider variety of comparative constructions and Section 3.6 discusses and defends the commitments of the account to a particular analysis of the equative. To keep things simple, the majority of the chapter focuses sentences with the antonyms *tall* and *short*; Section 3.7 extends the account to other antonym pairs by incorporating assumptions about scale structure in Kennedy and McNally (2005).

As an aside: the term ‘evaluativity’ comes, as far as I can tell, from Neeleman et al. (2004). Seuren (1984) refers to the same semantic property as ‘orientedness,’ Bierwisch (1989) as ‘norm-relatedness,’ and Murphy (2006) as ‘committedness’. Although I view it as slightly more intuitive than the others, the term ‘evaluativity’ is potentially confusing given that adverbs which are derived from predicates like ‘surprise’ have traditionally been called ‘evaluative’ (Katz, 2005, a.o.). The adverbs *surprisingly* and *amazingly*, for instance, are derived from predicates like *be surprised that* and *be amazed that* which are used to describe instances in which the speaker evaluates a situation with respect to his expectations. This is a different use of the term ‘evaluative’ and I will thus avoid it when discussing these terms, referring to them instead as ‘expectation adverbs’.

3.2 Evaluativity and the positive construction

What's just as striking as the strong correlation between positive constructions and evaluativity is the absence of evaluativity in some other constructions. Take for instance the MP construction in (2).

(2) Lou is 5ft tall.

Given the reliable correlation between positive constructions and evaluativity, we can test for the evaluativity of sentences with overt degree morphology by determining their entailment relationship to their corresponding positive forms. Specifically, if a sentence with degree morphology (e.g. *Adam is as tall as Doug*) entails its corresponding positive construction (e.g. *Doug is tall*), then it is evaluative (this test is used in, Bierwisch, 1989, and so I'll refer to it as the Bierwisch test for evaluativity).²

Because evaluativity is context sensitive, this notion of entailment is one that requires holding fixed the context of utterance – and thus the contextually-valued standard – across the two sentences: ϕ entails ψ iff for every context c , if ϕ is true at c then so is ψ . The fact that (2) does not entail that Lou is tall suggests that it is not evaluative; confirmation of this comes from the intuition that (2) is true in a context in which someone with a height of 5ft is considered to be quite short. Importantly, the larger implication of this is that evaluativity isn't a part of the meaning of the adjective *tall*.

²In Rett (2008), I present this test with the antecedent and consequent of the conditional reversed ('if a sentence is evaluative, it entails its positive counterpart'). Roger Schwarzschild (p.c.) points out that this way of formulating the Bierwisch test erroneously predicts that some evaluative sentences are not actually evaluative. He gives as an example *John isn't tall*, which clearly doesn't entail the positive construction *John is tall*, but which seems nevertheless to be evaluative (it denies that John's tallness exceeds a standard, not that John has a height). I have rephrased this test accordingly, although in its current form here it cannot make any predictions about the negation case. I present an account of why such expressions are evaluative in Section 3.4.4.

The MP construction in (2) suggests that *tall* takes two arguments: an individual (the subject *Lou*) and a degree (the MP *5ft*). This is in line with the semantics of gradable adjectives in (3).

$$(3) \quad \llbracket tall \rrbracket = \lambda x \lambda d. tall(x, d)$$

To be *d*-tall is to be tall at least to degree *d*; this means that each individual is associated with several degrees of tallness, rather than one degree of maximum tallness (or height). The difference between an individual's height and tallness on this view is significant, and the terms have therefore been used carefully.

Juxtaposing the MP construction in (2) with its corresponding positive construction illustrates the question which has historically formed the basis of the study of evaluativity: what is the nature of evaluativity such that its presence is marked by the absence of a degree argument, and vice versa? Given this way of presenting the problem, one solution is the following: while the MP in (2) fills the degree argument of *tall*, positive constructions like (1) contain a null morpheme ('POS' for 'positive construction') which restricts the degree argument to those degrees which exceed a standard, and binds the argument.

Essentially this solution has been proposed by Bartsch and Vennemann (1972); Cresswell (1976); von Stechow (1984a); Kennedy (1999b). Altered based on our assumptions about the semantics of gradable adjectives in (3) (see also Heim and Kennedy, 2002, "Capturing Gradability," p. 8), POS looks something like this:

$$(4) \quad \llbracket POS \rrbracket = \lambda \mathcal{A}_{\langle e, \langle d, t \rangle \rangle} \lambda x \exists d [\mathcal{A}(x)(d) \wedge d > s]$$

POS takes a gradable adjective \mathcal{A} as its argument and returns a set of individuals which are \mathcal{A} to some high degree *d* (high relative to the contextual standard *s*).

The meaning of POS is designed, based on the observations above, to ensure the semantic incompatibility of POS and degree morphology. Because POS binds the degree argument of a gradable adjective, the presence in a degree construction

of any additional degree morphology would result in vacuous quantification. In some accounts, POS is base-generated in the head of the DegP, syntactically blocking as well as semantically blocking the presence of an MP.

Kennedy (1999b) additionally argues that POS has an overt counterpart in Chinese based on the data in (5):

- (5) a. Zhangsan *hen* gao.
Zhangsan *hen* tall
'Zhangsan is tall.'
b. Zhangsan *bi ni* (**hen*) gao.
Zhangsan than you (**hen*) tall
'Zhangsan is taller than you.'

The positive construction in (5a) is evaluative. A corresponding sentence without *hen*, however ('Zhangsan gao'), is infelicitous unless the context of utterance allows for a comparative interpretation (in which case the sentence is not evaluative). Kennedy likens *hen* to POS by additionally arguing that *hen* is in complementary distribution with the (null) comparative morpheme (5b).

The POS analysis has been widely adopted in degree semantics literature, as well as in some studies in event semantics which focus on (a)telic interpretations of deverbal adjectives (Hay et al. 1999, Piñón 2005, Kennedy and Levin 2008 and Beavers 2008b, a.o., although see von Stechow 2005 and Murphy 2006 for alternative approaches). Its most obvious consequence is its prediction that any degree construction with overt degree morphology will not be evaluative. If an adjective's degree argument is saturated by or bound by a degree morpheme, it is not available to be bound (again) by POS (or vice-versa).

However, as has been well documented, the semantic property of evaluativity is not restricted to the positive construction, but occurs systematically in many different degree constructions. This is the subject of the next section.

3.3 Recasting the distribution of evaluativity

The data in (6) reinforces the POS prediction that a sentence with overt degree morphology is not evaluative.

- (6) a. Adam is as tall as Doug.
b. Adam is taller than Doug.
c. How tall is Adam?
d. Adam is too tall for his pants.

The equative in (6a) does not entail that either Adam or Doug is tall; it could be used to discuss two individuals who are clearly short. Similarly with the comparative in (6b). The interrogative in (6c) does not suggest an expectation that Adam is tall, and (6d) does not entail that Adam is tall.

However, the situation changes when we examine some degree constructions with negative antonyms (Lyons, 1977; Cruse, 1992; Bierwisch, 1989, a.o.).

- (7) a. Adam is as short as Doug.
b. How short is Adam?

The equative in (7a) entails that Adam and Doug are short. The question in (7b) comes with a presupposition that Adam is short in contrast to its positive-antonym counterpart in (6c), which does not come with a presupposition that Adam is tall.³ That these two forms are evaluative suggests that an analysis of evaluativity should not restrict its distribution to the positive construction.⁴

³The Bierwisch test for evaluativity makes use of *entailment* relations between sentences, and the interrogative in (7b) only presupposes its corresponding positive construction. This is a result of the meaning of interrogatives; the fact that they presuppose the relevant positive construction indicates that evaluativity is in fact a part of their content.

⁴An investigation into other Chinese constructions reveals that, contra Kennedy (1999b), evaluativity is present in Chinese degree constructions in the absence of *hen* (cf. (5a)). The equative below is evaluative like its English counterpart, but is ungrammatical with *hen*. (Thanks to Xiao Li for data and discussion.)

- (8) John he Mary yiyang (*hen) ai.
John and Mary same (*hen) short 'John is as short as Mary.'

In other accounts of the data in (8), *hen* is glossed as *very* (Sybesma, 1999, a.o.). See also Grano (2008) for an analysis in which *hen* is argued to be a construction-specific assertive marker.

Importantly, the evaluativity of the sentences in (7) isn't necessarily a result of the fact that they involve the antonym *short* rather than *tall*. The two sentences below contain *short* but are non-evaluative:

- (9)
- a. Adam is too short for his pants.
 - b. Adam is shorter than Doug.
 - c. Adam is short enough to stand inside the bungalow.

Neither (9a), (9b) nor (9c) entail that Adam is short. I can utter (9a) in a situation in which Adam is very tall by anyone's standards, say, 8 feet, but just happens to have bought pants that are much longer than he needs them to be. I can truthfully utter (9b) in a situation in which both Adam and Doug are giants, and we're just trying to ascertain which is taller. And I can utter (9c) in a scenario in which Adam is so tall that he usually can't stand indoors, but he happens to be able to do so in the bungalow. This shows that although the distribution of evaluativity needs to be more free than POS allows, it still needs to be constrained across degree constructions in a non-obvious way.

3.4 The degree modifier EVAL

The distribution of evaluativity extends beyond the positive construction, so in order to properly characterize evaluativity we need to account for the fact that it can cooccur with overt degree morphology like equative *as...as* or the *wh*-word *how*. Instead of asking where evaluativity occurs, the present approach essentially rephrases the question: where *can't* evaluativity occur?

3.4.1 EVAL and its distribution

The semantics of EVAL

The principle failure of the POS account is that it restricts the distribution of evaluativity to only those constructions without an overt degree quantifier. It does this semantically, defining POS as a function which binds the degree argument of a gradable adjective. (In some accounts, this semantic restriction is accompanied by a syntactic one.) Now that it's clear that evaluativity and degree quantifiers can cooccur, we need to rethink how to encode evaluativity.

Perhaps a better way of describing the distribution of evaluativity is that it can occur in any degree construction except comparatives, excessives, and *enough*-constructions (see (9)). Whether or not it occurs in a degree construction additionally depends on the polarity of the predicate involved. Instead of positing a new morpheme POS' which can occur in any of the constructions in the awkward class 'positive constructions and equatives and degree questions,' it seems more promising to encode evaluativity in a morpheme which can occur freely and optionally in any degree construction. The onus of such an account would then be to provide other reasons for why it cannot and must occur in some constructions.

We have seen from the discussion of the syntactic and semantic properties of *m*-words in Chapter 2 that degree modifiers can occur freely and optionally in degree constructions. This first property comes from the fact that the domain a degree modifier – unlike e.g. POS as it is formulated in (4) – is a set of degrees, and is not linked to a particular type of morpheme or syntactic position.

This second property, optionality, comes from the fact that a degree modifier does not effect the semantic type of an expression it occurs in. POS (in (4)), for instance, is a function from a gradable adjective denotation (type $\langle e, \langle d, t \rangle \rangle$) to a set of individuals (type $\langle e, t \rangle$). Given the assumptions made in these accounts, an

expression which does not contain an overt degree binder requires POS for type reasons. Given that e.g. *Adam is as tall as Doug* and *Adam is as short as Doug* differ in evaluativity but not in type, it is important that a morpheme which encodes evaluativity be optional in a given construction.

A quick note on evaluativity and null morphemes: it seems to me that the best way to talk about the distribution of evaluativity is as a morpheme, as in the POS account. This is less than ideal considering that it seems languages are consistent in not pronouncing such a morpheme. An alternative explanation – that evaluativity arises pragmatically as a scalar implicature – looks initially promising because an evaluative reading of a sentence like *Adam is as short as Doug* entails a non-evaluative reading (in which they are of the same height, but not short). However the fact that evaluativity is affected by the semantics of the degree quantifier in the construction, as well as the polarity of the adjective involves, strongly suggests that the evaluativity of an expression is determined by its semantic features, and therefore in the semantics.

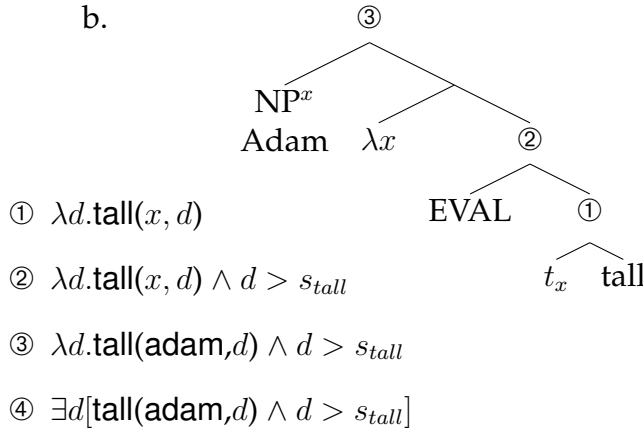
Evaluative constructions reference degrees that are high on a scale with respect to a standard. So we can think of the degree modifier that encodes evaluativity ('EVAL') as a function from a set of degrees to a subset of those degrees (the ones above the standard).

$$(10) \quad \llbracket \text{EVAL}_i \rrbracket = \lambda D \lambda d. D(d) \wedge d > s_i$$

' s_i ' is a pragmatic variable (one left unbound in the semantics). Each instance of EVAL in a form introduces a possibly distinct pragmatic variable, which necessitates the indexing above.⁵ The tree below illustrates how EVAL results in an evaluative reading for a positive construction. Note that nothing I have said so far *forces* the positive construction to be evaluative; I'll return to that later.

⁵For instance, it's clear that the sentence *Adam is tall and thin* involves two different standards (one of tallness, one of thinness), and therefore two different EVALs.

- (11) a. Adam is tall.
 b.



Following Bhatt and Pancheva (2004) a.o., the subject *Adam* is base-generated in the functional projection “aP,” which takes AP as its complement. In raising to its surface position, it leaves a trace of type x , which is λ -abstracted over before the moved element is interpreted its surface position.

The trace t_x saturates the individual argument of the gradable adjective. This results in a set of degrees d – where Adam is d -tall – which becomes the argument of EVAL. Assuming a situation in which Adam is 6ft tall and the contextually supplied value for s_i is 4ft, the argument of EVAL includes {1ft, 2ft, 3ft, 4ft, 5ft, 6ft} and its value includes {5ft, 6ft} (the set containing those degrees that are above the standard).⁶ The degree variable is then bound via existential closure in the absence of an overt quantifier. This is reflected in ④.

The result is an analysis in which the two differences between the positive construction and its MP counterpart (the absence of degree morphology and the presence of evaluativity) are accounted for with two different mechanisms. The positive construction is evaluative because it contains EVAL. The (independent) fact that its degree argument isn’t saturated or bound overtly is resolved by existential closure.

⁶These sets include all the degrees d between e.g. 5ft and 6ft, as well, as the scale of tallness is dense; I omit them for simplicity’s sake.

The distribution of EVAL

As it's formulated, the EVAL account predicts that *any* degree construction can be evaluative, but we've seen that this is not the case. Comparatives and excessives are not evaluative, nor are equatives and interrogatives with positive antonyms; but equatives and interrogatives with negative antonyms are. The table below shows the distribution of EVAL among sentences with overt degree quantifiers. I will return to the positive construction in §3.4.4.

TABLE 3.1 *The Distribution of Evaluativity in Forms with Overt Degree Quantifiers*

POLAR-INVARIANT FORMS		POLAR-VARIANT FORMS	
COMPARATIVES		EQUATIVES	
Doug is taller than Adam.	[-E]	Doug is as tall as Adam.	[-E]
Doug is shorter than Adam.	[-E]	Doug is as short as Adam.	[+E]
<i>Enough</i> -CONSTRUCTIONS		DEGREE QUESTIONS	
Doug is tall enough to ride.	[-E]	How tall is Adam?	[-E]
Doug is short enough to join.	[-E]	How short is Adam?	[+E]
EXCESSIVES			
Doug is too tall to join.	[-E]		
Doug is too short to ride.	[-E]		

The data is divided into two categories: forms like the comparative are labeled 'polar-invariant' because their (non-)evaluativity is not dependent on the polarity of the its predicate. Forms like the equative are 'polar-variant' because their evaluativity *is* dependent on the polarity of the predicate (forms with positive predicates are [-E], forms with negative predicates are [+E]).

In addition to showing that evaluativity can cooccur with overt degree morphology, the data in Table 3.1 demonstrate that the distribution of evaluativity amongst sentences with overt degree morphology is complex. As I've indicated, this first fact is enough to abandon the POS account. But an alternative account needs to also predict this complex distribution. The next two subsections discuss two factors which play a role in whether or not a degree construction is evaluative: the polarity of the predicate and the nature of the degree quantifier.

3.4.2 Polarity

Table 3.1 shows that the polarity of an antonym in a sentence can effect whether or not that sentence is evaluative. This section discusses differences between antonyms that are relevant to the distribution of evaluativity.

Scale reversal

The difference in meaning between two antonyms (e.g. *tall* vs. *short*) comes from the fact that they make use of scales which share the same dimension but differ in the ordering imposed on that dimension (Cresswell, 1976; Seuren, 1984; von Stechow, 1984a; Bierwisch, 1989; Kennedy, 1999a,b). The fact that *tall* and *short* differ only in their ordering is illustrated by the following entailment patterns:

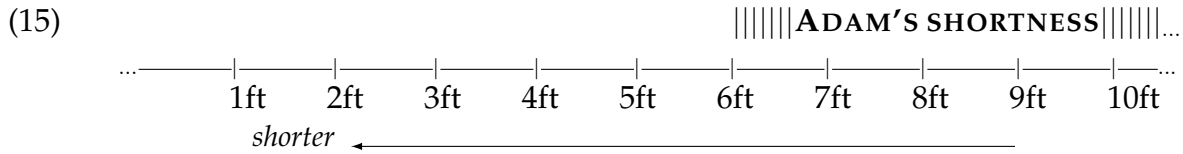
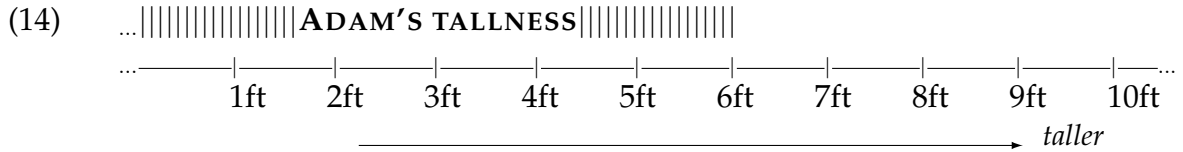
- (12) a. Adam is taller than Doug. \rightarrow Adam is not shorter than Doug.
b. Adam is shorter than Doug. \rightarrow Adam is not taller than Doug.

What does it mean for gradable adjectives to be associated with scales that differ in direction? Recall the definition of *tall*, repeated below.

$$(13) \quad \llbracket tall \rrbracket = \lambda x \lambda d. tall(x, d)$$

Gradable adjectives are functions from individuals to sets of degrees. Recall that scales are triples $\langle D, <_{\mathcal{R}}, \Psi \rangle$ with D a set of degrees, $>_{\mathcal{R}}$ a total ordering on D , and Ψ a dimension (e.g. 'height'). We can characterize antonymy as follows: *tall* and *short* are antonyms because they have in common the same dimension but differ in that they have the opposite ordering on this dimension.

The figures in (14) and (15) illustrate the concept of the scales associated with *tall* and *short* respectively. Assuming that Adam is 6ft tall, Adam's tallness and shortness are represented on the scales respectively. (This conception of antonyms has been used explicitly in von Stechow, 1984a,b, a.o.).



The direction of these scales and the depiction of Adam's tallness and shortness in (14) and (15) are determined by the behavior of the predicates *tall* and *short* in the comparative. We know that someone who is 8ft tall is taller than someone who is 6ft tall, so the degree '8ft' is higher on the 'tall' scale than the degree '6ft'. Similarly, we know that someone who is 3ft tall is shorter than someone who is 5ft tall, so the degree '3ft' is higher on the 'short' scale than '5ft'. If Adam is 6ft tall, he has degrees of shortness that someone who is 8ft tall lacks. This leads to the depiction of Adam's shortness in (15).

I will represent a set of degrees associated with the predicate tall as D_{tall} and so forth. We can represent the degrees to which Adam is tall and short as follows:⁷

- (16) a. Adam's tallness: {1ft, 2ft, 3ft, 4ft, 5ft, 6ft}_{tall}
 b. Adam's shortness: {6ft, 7ft, 8ft, 9ft, 10ft, ...}_{short}

The set of degrees to which Adam is tall and the set of degrees to which Adam is short have an endpoint in common. This is a factor of their antonymy. The scales associated with antonyms are mapped along the same dimension but are mirror images of each other. This means that the points along this dimension which they have in common share only a single point: the highest degree of tallness on the tallness scale, and the highest degree of shortness on the shortness scale. The result

⁷I've drawn the scales in (14) and (15) without minimal or maximal endpoints, in keeping with the conclusion drawn in Kennedy and McNally (2005), which I discuss in §3.7. This means that the height scales approach zero, never actually reaching it. I nevertheless list the degrees associated with Adam's tallness in (16) as starting with 1ft for simplicity's sake.

is that the degree to which Adam is tall is at the same point as the degree to which Adam is short.

We can capture this idea formally with the definition of antonymy in (17) (which invokes a maximality operator that is sensitive to the direction of the scale, (18)).

(17) For all adjectives A, A' and for all x in the domain of A, A' , A and A' are antonyms iff: $\text{MAX}[A(x)] = \text{MAX}[A'(x)] \wedge A(x) \cap A'(x) = \{\text{MAX}(A(x))\}$,
Where MAX is defined relative to the direction of the scale:

(18) Let D be a non-empty set of degrees ordered by the relation $<_{\mathcal{R}}$, then
 $\text{MAX}(D) = \iota d[d \in D \wedge \forall d' \neq d \in D[d' <_{\mathcal{R}} d]]$

The definition in (17) says that two adjectives are antonyms if, for any individual x in the domain of both adjectives, the maximum degree in the range of one adjective is the same point as the maximum degree in the range of the other adjective (and that, furthermore, this is the only point the two sets of degrees have in common). (18) defines the maximum degree in a set relative to the order of the scale (as opposed to some objective constant order), which is also determined by the behavior of the adjective in the comparative form.

The important consequence of this characteristic of antonyms is that we can reliably infer from Adam's tallness to Adam's shortness (and vice-versa) if we know that *tall* and *short* are antonyms.

Markedness

It has additionally been argued that an antonym pair consists of a marked and an unmarked element, and that the negative antonym (e.g. *short*) is marked relative to its positive counterpart (e.g. *tall*). There are roughly two reasons for thinking this: the first is that the distribution of the negative-polar antonym is restricted relative to the distribution of the positive-polar antonym. The second is that the negative-polar antonym seems to semantically encode the force of negation (which is in some cases morphologically overt).

Lyons says, “We tend to say that small things lack size, that what is required is less height, and so on, rather than that large things lack smallness and that what is required is more lowness” (Lyons, 1977, 275). The conclusion that follows is that, e.g., “*long* is unmarked with respect to *short* because it occurs in a variety of expressions from which *short* is excluded” (Cruse 1986, 173; see also Horn 1972 and Lehrer 1985). (19) shows that some positive antonyms can occur with measure phrases, but their negative counterparts cannot; (20) shows that positive antonyms but not negative ones can have nominal forms.

- (19) a. This one is 10ft long.
 b. *This one is 4ft short.
- (20) a. What is its length?
 b. *What is its shortness?

This generalization is also illustrated in (21) (Cruse, 1992, 298).⁸

- (21) a. only half as long ~ ?only half as short
 b. only half as fast ~ ?only half as slow
 c. only half as big ~ ?only half as small
 d. only half as thick ~ ?only half as thin

The second motivation for thinking that negative-polar antonyms are marked relative to their positive-polar counterpart comes from observations in Rullman (1995) and Heim (2007) that e.g. *short* is the negative version of *tall*. Other antonyms wear this negation on their sleeves:

⁸Croft and Cruse (2004) point out an additional fact of this kind, one which is interesting given the discussion of the meaning of the equative and its modifiers in Section 3.6: on the rare occasion a speaker accepts the sentences *A is twice as short as B* or *A is half as short as B*, which both have a negative-polar adjective but differ in their factor modifier, he considers them synonymous. Conversely, no speaker would consider the sentences *A is twice as tall as B* and *A is half as tall as B*, which differ from the previous pair only in that their adjective is positive-polar, to be synonymous. Croft and Cruse take this as evidence that *short* is a ‘sub term’ (p. 174), which we can interpret as ‘marked relative to *tall*’ for our purposes. Thanks to Daniel Buring for bringing this data to my attention. The unacceptability of negative antonyms and factor modifiers is at odds with the claims made about these sentences in Rett (2008).

- (22) a. possible ~ impossible
 b. happy ~ unhappy
 c. kind ~ unkind

Rullman (1995), Kennedy (2001) and Heim (2007) argue that negative-polar antonyms involve implicit negation because they exhibit ambiguity in some sentences relative to their positive counterparts. The argument starts with the observation that comparatives formed with *more* and *less*. Unlike comparatives with *more*, *less*-comparatives are ambiguous:⁹

- (23) The helicopter was flying less high than a plane can fly.
 (cf. 'The helicopter was flying higher than a plane can fly')
- a. The minimum altitude a plane can fly is 1,000 feet, and the helicopter was flying below that.
 b. The maximum altitude a plane can fly is 100,000 feet, and the helicopter was flying below that.

Rullman and Heim argue that the above ambiguities show that *less*, but not *more*, involves an additional negative meaning. The same difference in meanings can be extended to antonym pairs (Heim, 2000b, 2007).

- (24) The helicopter was flying lower than a plane can fly.
 (cf. 'The helicopter was flying higher than a plane can fly')

This sentence has the same ambiguities as the one in (23), which indicates that *low* is a negation of its counterpart *high* in the same way that *less high* is (although see Heim, 2007, for a few caveats). This indicates that negative-polar antonyms – like *low* and *short* – have a more complex meaning than their positive-polar counterparts. Negative antonyms are marked semantically and in some cases morphologically, e.g. *clean* and *unclean*, relative to positive antonyms.

These two different types of observations are evidence that there is an asymmetry between antonyms, and specifically that negative-polar antonyms are marked

⁹These examples are from Rullman (1995), who points out (p. 83) that the problem had been previously discussed in Seuren (1979).

with respect to positive-polar ones. Although the analysis presented here requires only that negative-polar antonyms be marked with respect to positive-polar ones, I find Rullman's and Heim's explanation of the difference in markedness compelling. Further discussion of the data in (23) can be found in Büring (2007).

To sum up: Table 3.1 demonstrates that there are two factors that lead to polar-(in)sensitivity: the polarity of the predicate in a sentence and the meaning of the degree quantifier in the sentence. There are two significant aspects of the former: polar antonyms differ in the ordering of the scales they are associated with, and positive polar antonyms are unmarked relative to negative polar antonyms. The following subsection discusses the latter factor.

3.4.3 Polar (in)-variance

The pairs in (25) and (26) show that switching a degree quantifier from *-er* to *as* is enough to make an expression polar-variant.

- (25) a. Adam is taller than Doug. [-E]
b. Adam is shorter than Doug. [-E]
- (26) a. Adam is as tall as Doug. [-E]
b. Adam is as short as Doug. [+E]

This section examines polar-(in)variance by using the semantic properties of comparatives and equatives as a case study. I'll briefly outline my assumptions about the semantic nature of comparatives and equatives, and then move on to demonstrate the property of polar (in)-variance.

The semantics of the comparative and equative

The analysis of the comparative I use can be characterized as an 'A-not-A' analysis, which has its roots in Ross (1969); Seuren (1978, 1984) and Larson (1988). Schwarzschild (2008) discusses the motivation and extension of such an account.

The nomenclature ‘*A-not-A*’ comes from the proposal that comparatives like (28a) are ellided versions of (28b) (and so include two tokens of an adjective in the semantics), and have the truth conditions in (28c). This allows for the definition of the comparative morpheme in (29).¹⁰

- (28) a. Doug is taller than Adam.
 b. Doug is taller than Adam is tall.
 c. $\exists d[\text{tall}(\text{doug},d) \wedge \neg \text{tall}(\text{adam},d)]$
- (29) $\llbracket \text{-er} \rrbracket = \lambda D' \lambda D'' \exists d [D'(d) \wedge \neg D''(d)]$

There are two reasons to posit a negative operator in the subordinated clause of a comparative: 1) NPIs are licensed in *than*-clauses (30); and 2) comparatives with other quantifiers and modals display scope interaction effects (31).

- (30) a. Doug is taller than any other optometrist.
 b. Adam is taller than Doug ever was.
- (31) a. The balloon is higher than it is allowed to be.
 (*The balloon meets or exceeds the degree it is **not allowed** to meet or exceed.*)
 b. The balloon is higher than it should be.
 (*The balloon meets or exceeds the degree it **should not** meet or exceed.*)

¹⁰In (29), the comparative is a relation between sets of degrees, type $\langle\langle d, t \rangle, \langle\langle d, t \rangle, t \rangle\rangle$, with existential quantification over d being encoded in the comparative morpheme. Alternatively, given the evidence that the comparative morpheme can be modified by e.g. *m*-words as in *Doug is much taller than Adam*, we could have a definition of the comparative as in (27) (which is the one used in Chapter 2).

(27) $\llbracket \text{-er}' \rrbracket = \lambda D' \lambda D'' \lambda d [D'(d) \wedge \neg D''(d)]$

This characterizes the comparative as a function from a set D'' of degrees and a set D' of degrees to a set of degrees d (type $\langle\langle d, t \rangle, \langle\langle d, t \rangle, \langle d, t \rangle\rangle\rangle$). In such an account, d would be bound via existential closure. This same reasoning could be applied to the equative, which can be modified by expressions like *at most, just, only, roughly* (Schwarzschild, 2008), which might themselves contribute quantification over degrees. I characterize both the comparative and the equative as contributing existential quantification here to keep things relatively simple, but believe that a complete and explicit account of the comparative requires the definition in (27).

Schwarzschild (2008) argues that the meaning of the equative morpheme is similar to that of the comparative morpheme, but it involves a maximality operator instead of negation.¹¹

- (32) a. Adam is as tall as Doug.
 b. $\exists d[\text{tall}(\text{adam},d) \wedge \text{MAX}(\lambda d''.\text{tall}(\text{doug},d'')) = d]$

(33) $[[as_1]] = \lambda D''\lambda D'\exists d[D'(d) \wedge \text{MAX}(D'') = d]$

These truth conditions hold when the maximum degree d to which Doug is tall is also a degree to which Adam is tall. These truth conditions correspond to the ‘at least’ reading of the equative, which allow an equative construction like (32a) to be true even if Adam is taller than Doug. Interpreted with this definition of the equative, a bare equative like (32a) means the same as it would if it had an overt modifier *at least*.

Omitting this maximality operator from the meaning of the equative produces very weak truth conditions requiring only that the two individuals share some degree of height, which is trivially true for any two objects with a height (I return to discuss this meaning in Section 3.6). Defining the equative so that a maximality operator is applied to *both* arguments of the equative morpheme results in the ‘exactly’ reading. With this definition, the equative in (35a) would instead have the meaning in (35b), and would mean that *Adam is as tall as Doug* has the same meaning as *Adam is exactly as tall as Doug*.

(34) $[[as_2]] = \lambda D''\lambda D'\exists d[\text{MAX}[D'] = d \wedge \text{MAX}[D''] = d]$

- (35) a. Adam is as tall as Doug.
 b. $\exists d[\text{MAX}(\lambda d'.\text{tall}(\text{adam},d')) = d \wedge \text{MAX}(\lambda d''.\text{tall}(\text{doug},d'')) = d]$

Of these two possible definitions of the equative morpheme, the ‘exactly’ *as*

¹¹In Schwarzschild (2008), the negation and maximality operator are generated in concert with but separately from the comparative (they are described as “silent operator[s] base-generated adjacent to the adjective,” Appendix I). This allows for the negation and maximality operators to scope above modals like *allow*, which results in the ambiguity observed in many comparatives (see also Kennedy, 1999b; Heim, 2000a). I acknowledge that such a move is necessary but I do not follow it here for expositional reasons. (The same goes for the definition of *less* in (81).)

in (35a) differs most substantially from the comparative morpheme. Specifically, imagine a model M_1 in which Adam is 6'4" and Doug is 6'2".

- (36) a. $\llbracket \text{Adam is taller than Doug} \rrbracket^{M_1} = 1$
 b. $\llbracket \text{Adam is } as_1 \text{ tall as Doug} \rrbracket^{M_1} = 1$
 c. $\llbracket \text{Adam is } as_2 \text{ tall as Doug} \rrbracket^{M_1} = 0$

Imagine a model M_2 in which Adam and Doug are both 6'4".

- (37) a. $\llbracket \text{Adam is taller than Doug} \rrbracket^{M_2} = 0$
 b. $\llbracket \text{Adam is } as_1 \text{ tall as Doug} \rrbracket^{M_2} = 1$
 c. $\llbracket \text{Adam is } as_2 \text{ tall as Doug} \rrbracket^{M_2} = 1$

The two definitions of the equative pattern the same in Model M_2 . However, the fact that the as_1 construction patterns with the comparative rather than the as_2 construction in Model M_1 demonstrates that, at least in this respect, the 'at least' reading of as is more like the comparative than the 'exactly' reading of as . Given that the evaluativity data indicates that the meaning of the comparative and equative morphemes differ significantly, and given that it is the goal of this section to account for this difference, I will assume that the equative has the meaning of as_2 . In Section 3.6, I'll provide additional arguments for this assumption.

The nature of polar (in)-variance

The distribution of evaluativity in a given expression is determined by the polarity of the predicate involved and what type of degree quantifier (if any) occurs in that expression. I've referred to one type of degree quantifier as 'polar-variant' and the other as 'polar-invariant,' but it's not immediately obvious what it is about these quantifiers that makes them polar-variant or polar-invariant.

The only clue we're provided by the data in Table 3.1 is that the relevant property of these quantifiers interacts with the polarity of a predicate. Given the arguments above that polarity differences between antonyms translate to scale reversal,

it seems reasonable to suspect that polar-(in)variance amounts to a sensitivity to the ordering of a given set of degrees. Specifically, that a polar-invariant quantifier is one whose meaning does not depend on the ordering of the degrees it ranges over, while a polar-variant quantifier is one whose meaning *does*.

This suspicion is confirmed by looking at the difference in entailment patterns between polar-invariant sentences with different antonyms and polar-variant sentences with different antonyms. For a polar-variant construction like the equative, the negative-antonym form entails its positive-antonym counterpart (38a);¹² for a polar-invariant construction, the negative-antonym form does not entail its positive-antonym counterpart (38b).

- (38) a. Doug is as short as Adam. \rightarrow Doug is as tall as Adam.
 b. Doug is shorter than Adam. \nrightarrow Doug is taller than Adam.

These entailment patterns are due to the fact that the negative-polar form in (38a) is true iff two conditions hold: i) that Adam and Doug are the same height, and ii) that Adam and Doug are short. The positive-polar form in (38a) is true only iff Doug and Adam are the same height. In contrast, for the negative form in (38b) to be true, Adam's height needs to exceed Doug's height; and for the positive form in (38b) to be true, Doug's height needs to exceed Adam's.

The difference can be summarized as follows: for polar-variant constructions, the truth conditions of a negative form are a subset of the truth conditions of its corresponding positive form. For polar-invariant constructions, the truth conditions of a negative-antonym form and its positive-antonym counterpart are disjoint, or contrary.

Because of the nature of EVAL, the analysis presented here predicts that any degree expression can potentially have an evaluative and a non-evaluative inter-

¹²This is true for *how many* questions as well, assuming the semantics of questions from Groenendijk and Stokhof (1984) in which a question Q_1 entails a question Q_2 iff the denotation of Q_1 (a set of propositions) is a subset of the denotation of Q_2 . Thus *How short is Adam?* \rightarrow *How tall is Adam?*

pretation. This means that the equative forms in (39) and (40) are each ambiguous between two meanings, one which is [+E] (contains an EVAL) and one which is [-E] (does not contain an EVAL).¹³

(39) Adam is as tall as Doug.

- a. [-E]: $\exists d[\text{MAX}(\lambda d'.\text{tall}(\text{adam},d'))=d \wedge \text{MAX}(\lambda d''.\text{tall}(\text{doug},d''))=d]$
- b. [+E]: $\exists d[\text{MAX}(\lambda d'.\text{tall}(\text{adam},d'))=d \wedge \text{MAX}(\lambda d''.\text{tall}(\text{doug},d'')) \wedge d'' > s_{\text{tall}}]=d]$

(40) Adam is as short as Doug.

- a. [-E]: $\exists d[\text{MAX}(\lambda d'.\text{short}(\text{adam},d'))=d \wedge \text{MAX}(\lambda d''.\text{short}(\text{doug},d''))=d]$
- b. [+E]: $\exists d[\text{MAX}(\lambda d'.\text{short}(\text{adam},d'))=d \wedge \text{MAX}(\lambda d''.\text{short}(\text{doug},d'')) \wedge d > s_{\text{short}}]=d]$

(Both of the [+E] truth conditions above are the result of the configuration in (41a), in which EVAL occurs in the complement clause of the equative and not the matrix clause. Because the argument of EVAL can be any set of degrees, an alternative [+E] meaning of the equative could be formed from the structure in (41b), where EVAL is in the matrix clause but not the complement clause, or the structure in (41c), where it is in both.

- (41) a. [as [_{D'} Adam is d' -tall] [_{D''} EVAL Doug is d'' -tall]]
- b. [as [_{D'} EVAL Adam is d' -tall] [_{D''} Doug is d'' -tall]]
- c. [as [_{D'} EVAL Adam is d' -tall] [_{D''} EVAL Doug is d'' -tall]]

The differences between the [+E] meanings in (41) aren't immediately pressing particularly because, for the meaning of the equative we're using, each reading entails the other. In Section 3.6.3, I'll return to the differences, arguing that the presupposition projection of evaluativity in the equative favors the structure in (41a.)

What's important for an understanding of polar (in)-variance is the fact that (39a) and (40a) mean the same thing: they are mutually entailing. (39a) says that

¹³Whether or not an expression is evaluative is an empirical claim (it either references a degree which exceeds a standard or it does not). A given expression, as this section makes clear, can have a meaning which contains the degree modifier EVAL (can be [+E]) or it can have a meaning which does not contain EVAL (can be [-E]). I keep these notions separate because of the complicated relationship between them: an expression which has only a [+E] meaning is in fact evaluative, while an expression which has both a [+E] and [-E] meaning is non-evaluative.

Adam's maximal degree of tallness is the same as Doug's maximal degree of tallness. (40a) says that Adam's maximal degree of shortness is the same as Doug's maximal degree of shortness.

Given what we already know about polar antonyms, the maximum degree to which a person is tall is the same as the maximum degree to which that person is short. Therefore, if P and Q are antonyms, and if the maximum degree to which Adam is P is the same as the maximum degree to which Doug is P , it necessarily follows that the maximum degree to which Adam is Q is the same as the maximum degree to which Doug is Q . The synonymy of the two [-E] meanings is in part an effect of the first characteristic of polar antonyms (that we can infer from one scale to the other).

The two [+E] interpretations, (39b) and (40b), are not similarly synonymous because they make reference to the 'tall' and 'short' standards respectively. (39b) and (40b) both equate Adam's and Doug's height, but (39b) additionally requires that the degrees d'' to which Doug is tall exceed a contextual standard. Because the standard by which an individual counts as 'tall' in any context will presumably differ from the standard by which an individual counts as 'short' in that context – and because 'exceed' depends on the direction of the scale – the inclusion of EVAL in (39b) and (40b) prevents these two interpretations from being synonymous in the relevant sense (mutually entailing).

This attribute of equative constructions becomes more interesting when one considers the potential interplay between this ambiguity and semantic competition. The relevant notion of semantic competition here is that when two sentences are synonymous then (and only then) is their relative markedness relevant. A theory of markedness suggests that when two forms differ only in χ , then the form with the least marked value of χ ([- χ], say, rather than [+ χ]) is less marked overall. If these two meanings are synonymous, it seems reasonable to conclude that the

marked meaning will be blocked by its unmarked counterpart.

The EVAL account predicts that a degree construction is ambiguous between an [+E] meaning and a [-E] meaning, prompting the truth conditions in (39) and (40). The two [-E] meanings, by virtue of the fact that they involve polar antonyms, are synonymous. Given this, and the notion of semantic competition, we can assume that the marked form – the one with the negative antonym *short* – is blocked by the availability of the unmarked form.

This means that while all degree constructions are *in principle* ambiguous with respect to evaluativity, the possible interpretations of at least the equative are restricted by semantic competition; specifically, the marked form is not in practice associated with a [-E] meaning.

(42)	Adam is as tall as Doug. NON-EVALUATIVE EVALUATIVE	Adam is as short as Doug. NON-EVALUATIVE EVALUATIVE
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The table in (42) shows us that this semantic competition renders the unmarked expression ambiguous between an [+E] and a [-E] interpretation, while the marked form has only an [+E] interpretation. This latter fact results in the evaluative status of ...*as short as*... equatives, while the former fact results in the non-evaluative status of ...*as tall as*...

If an expression is ambiguous between an [+E] and a [-E] interpretation, it cannot be said to be evaluative (i.e. it clearly does not entail its corresponding positive form). This is a new perspective on the semantic property of evaluativity but not, I think, an unintuitive one. This way of cashing out the meaning of the equative – in addition to this notion of semantic competition – accounts for why equative constructions display the evaluativity distribution they do. It also explains why comparatives (qua polar-invariant constructions) display a different evaluativity distribution.

As with the equative, the EVAL account predicts that a comparative construction is ambiguous between an [+E] and a [-E] meaning.

- (43) Adam is taller than Doug.
 a. [-E]: $\exists d[\text{tall}(\text{adam},d) \wedge \neg\text{tall}(\text{doug},d)]$
 b. [+E]: $\exists d[\text{tall}(\text{adam},d) \wedge \neg\text{tall}(\text{doug},d) \wedge d > s_{\text{tall}}]$
- (44) Adam is shorter than Doug.
 a. [-E]: $\exists d[\text{short}(\text{adam},d) \wedge \neg\text{short}(\text{doug},d)]$
 b. [+E]: $\exists d[\text{short}(\text{adam},d) \wedge \neg\text{short}(\text{doug},d) \wedge d > s_{\text{short}}]$

The truth conditions in (43a) hold if there is a degree d to which Adam is tall but to which Doug is not tall. Given that the predicate *tall* is downward-scalar (if someone is d -tall then he is d_n -tall, $d_n < d$), this amounts to saying that Adam's height exceeds Doug's height on the 'tall' scale. The truth conditions in (43b) are identical to those in (43a) except they impose an additional requirement: that a degree d to which Adam is tall but Doug is not exceeds the contextually relevant standard of tallness s_{tall} .

As was the case with the equative, the two [+E] meanings (43b) and (44b) are not synonymous because they both invoke the standards of their relevant scales. But what's interesting is that in the case of the comparative (and for all polar-invariant constructions), the two [-E] meanings are *also* not synonymous. This is simple enough to see without looking at the truth conditions: intuitively, 'X is taller than Y' has the *opposite* meaning of 'X is shorter than Y.' Specifically, if it is true that X is taller than Y, we know that it is also true that Y is shorter than X, which is incompatible with X being shorter than Y.

The lack of synonymy between the two [-E] interpretations of the comparative is a result of the meaning of the comparative quantifier. The comparative differs from the equative in employing the direction of the relevant scale in its meaning, which prevents any synonymy between forms that are constructed with different antonyms in an antonym pair. The equative, on the other hand, has a meaning that

does not so depend on the direction of the scale.

Because the two [-E] meanings above are not synonymous, they are not subject to semantic competition. The result is that no potential interpretation of a comparative is blocked, and each comparative expression is therefore ambiguous between an evaluative and a non-evaluative interpretation. This means that comparatives are not evaluative.

(45)	<u>Adam is taller than Doug.</u> NON-EVALUATIVE EVALUATIVE	<u>Adam is shorter than Doug.</u> NON-EVALUATIVE EVALUATIVE
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This analysis assumes that a polar-invariant construction can – but need not – have an [+E] interpretation. This is a harmless assumption. There are two possible situations in which *Doug is as tall as Adam*, for instance, could be uttered. The first is one in which the hearer knows that Adam and Doug are tall relative to the contextually-valued standard. In this case, he can interpret the utterance as [+E] without running into any problems. The second situation is one in which the hearer does not know whether Adam or Doug are tall, in which case he can interpret the utterance as [-E].

Furthermore, it seems like there are some linguistic contexts in which the [+E] interpretation of a polar-invariant construction is preferred. Below is a construction in which a [-E] form – a positive-antonym question – is directly juxtaposed with its negative-antonym counterpart.

- (46) a. I don't know how tall or short Doug is.
 b. I don't know whether Doug is tall or short (or the extent to which he is tall or short).

An intuitive gloss of (46a) is (46b), which gives the positive-polar question an evaluative reading. Informally, it seems as though the evaluativity of *tall* is forced by a requirement that two disjuncts be semantically alike in terms of certain properties.

This, of course, can't be accounted for with a POS theory, which predicts con-

structions with overt degree morphology like *how* cannot be evaluative. But it also couldn't be accounted for with a theory which states that *How tall* can never have a [+E] interpretation. We can imagine a different formulation of the EVAL account above, in which the result of a markedness-based semantic competition is instead something like: "aligns unmarked forms with unmarked meanings and marked forms with marked meanings". Such an account could in theory provide the same results for the polar-(in)variant constructions above. It could not, however, account for a reading of (46a) in which *how tall* presupposes that Doug is tall.

Other degree quantifier constructions

I'll briefly extend this analysis to the other quantifier constructions in Table 3.1 by demonstrating that they exhibit the entailment patterns we would predict. Recall that quantity questions like *How short is Doug?* are polar-variant (though '→' in (47) should be read as 'presupposes that' rather than 'entails that' in the context of interrogatives).

- (47) a. How tall is Doug? \leftrightarrow Doug is tall.
 b. How short is Doug? \rightarrow Doug is short.

Just as with the equative, the two [-E] meanings of the interrogatives in (47) are mutually entailing. As in Chapter 2, I assume a semantics of questions following Karttunen (1977).

- (48) How tall is Doug?
 a. [-E]: $\lambda p \exists d [p(w^{\text{Q}}) \wedge p = \lambda w. \text{tall}(w)(\text{doug}, d)]$
 b. [+E]: $\lambda p \exists d [p(w^{\text{Q}}) \wedge p = \lambda w. \text{tall}(w)(\text{doug}, d) \wedge d > s_{\text{tall}}]$
- (49) How short is Doug?
 a. [-E]: $\lambda p \exists d [p(w^{\text{Q}}) \wedge p = \lambda w. \text{short}(w)(\text{doug}, d)]$
 b. [+E]: $\lambda p \exists d [p(w^{\text{Q}}) \wedge p = \lambda w. \text{short}(w)(\text{doug}, d) \wedge d > s_{\text{short}}]$

Given our view of the meaning of antonyms, the two [-E] meanings in (48a) and (49a) are mutually entailing. This isn't by virtue of the fact that they denote

the same set of propositions. The propositions denoted by (48a) involve degrees of tallness, while those denoted by (49a) involve degrees of shortness. But because of the nature of antonymy, each (true) proposition in the set denoted by (48a) entails a (true) proposition in the set denoted by (49a) (and vice-versa). The sets of propositions as a whole are therefore mutually entailing.

For instance, the proposition $\lambda w.\text{tall}(w)(\text{doug},6\text{ft})$ is in the set denoted by (48a), assuming that Doug is 6ft tall in the actual world, and by the definition of antonymy it entails the proposition $\lambda w.\text{short}(w)(\text{doug},6\text{ft})$, which is in the set denoted by (49a), holding fixed the actual world.¹⁴ Because of this synonymy, the unmarked [-E] meaning in (48a) blocks the marked (49a), which results (as we predict) in polar-variance.

Table 3.1 lists two constructions other than the comparative which are polar-invariant: *enough* constructions and excessives. For each, the two [-E] meanings of forms with different antonyms are not mutually entailing (i.e. these quantifiers are directional). The meanings of these constructions are simplified for our purposes from the discussion in Meier (2003) (although see the critical discussion of her analysis in Schwarzschild, 2008).

- (50) a. Adam is tall enough (to ride the London Eye). \rightarrow Adam is tall.
 b. Adam is short enough (to ride the London Eye). \rightarrow Adam is short.
- (51) a. Adam is too tall (for his pants). \rightarrow Adam is tall.
 b. Adam is too short (for his pants). \rightarrow Adam is short.
- (52) a. $[[\textit{enough}]] = \lambda D' \lambda D [\text{MAX}[D(d)] \geq \text{MIN}[D']]$
 b. $[[\textit{too}]] = \lambda D' \lambda D [\text{MAX}[D(d)] > \text{MAX}[D']]$

The meanings in (52a) and (52b) resemble the meaning of the comparative in that they rely on the ordering of the degrees. Specifically, these morphemes posi-

¹⁴Extending this to propositions like $\lambda w.\text{tall}(w)(\text{doug},2\text{ft})$ – in a world in which Doug is 6ft tall – and its inferences to ‘short’ propositions requires something like a metalinguistic operator which maps an individual’s degrees of tallness to the positive extension of a scale and that individual’s corresponding degrees of shortness to the negative extension of the scale (see e.g. Meier, 2003; Bale, 2007, for some proposals).

tion one degree over another on an ordering. As a result, the [-E] meanings of two constructions with different antonyms are not mutually entailing. I'll demonstrate this below only for the *enough* construction, again loosely basing the value of D' on Meier's compositional account.

- (53) Adam is tall enough to ride.
 a. [-E]: $\text{MAX}[\lambda d.\text{tall}(\mathbf{a},d)] \geq \text{MIN}[\lambda d'.\text{tall}(\mathbf{a},d') \rightarrow \text{could-ride}(\mathbf{a})]$
 b. [+E]: $\text{MAX}[\lambda d.\text{tall}(\mathbf{a},d) \wedge d > s_{\text{tall}}] \geq \text{MIN}[\lambda d'.\text{tall}(\mathbf{a},d') \rightarrow \text{could-ride}(\mathbf{a})]$
- (54) Adam is short enough to ride.
 a. [-E]: $\text{MAX}[\lambda d.\text{short}(\mathbf{a},d)] \geq \text{MIN}[\lambda d'.\text{short}(\mathbf{a},d') \rightarrow \text{could-ride}(\mathbf{a})]$
 b. [+E]: $\text{MAX}[\lambda d.\text{short}(\mathbf{a},d) \wedge d > s_{\text{short}}] \geq \text{MIN}[\lambda d'.\text{short}(\mathbf{a},d') \rightarrow \text{could-ride}(\mathbf{a})]$

Imagine that the physics of the London Eye ferris wheel are such that the ride can accommodate only people who are between 4ft and 7ft tall, and that Adam is 8ft tall. The truth conditions in (53a) require that in order for the [-E] meaning of *Adam is tall enough...* to hold, the maximum degree to which Adam is tall (Adam's height) must be greater than or equal to the minimum height one needs in order to be able to ride. This amounts to the claim that 8ft is higher on the 'tall' scale than 4ft, which is true.

The truth conditions in (54a), on the other hand, require that in order for the [-E] meaning of *Adam is short enough...* to hold, the maximum degree to which Adam is short (again Adam's height) must exceed the maximum height one can be in order to ride. This amounts to the claim that 8ft is higher on the 'short' scale than 7ft, which is false. The two [-E] meanings thus fall apart in this scenario, which means that the truth conditions in (53a) and (54a) are not mutually entailing. According to the EVAL account, this is directly correlated with the evaluativity data in (50).

Interim conclusions

To summarize, the distribution of evaluativity among sentences with overt degree morphology is determined by two characteristics of a degree construction: the polarity of the predicate, and whether or not the sentence is polar-variant. If a form is polar-variant, then a [-E] meaning of that form with an antonym A is synonymous with a [-E] meaning of that form with the antonym A' . The result is that these readings are subject to a markedness competition, and the [-E] meaning of the e.g. *short* form is therefore blocked by its *tall* counterpart. Negative-polar polar-variant constructions are thus evaluative, while positive-polar polar-variant constructions – as well as polar-invariant constructions – are non-evaluative (or ambiguously evaluative).

In light of this discussion, it has been clear that whether a quantifier is polar-variant or -invariant is a direct effect of whether or not its meaning relies on the direction of the ordering of the set of degrees it ranges over. (A polar-invariant quantifier does rely on direction, a polar-variant quantifier does not.) As a result, more explanatory labels for these quantifiers would be ‘directional’ and ‘non-directional’. I provide a definition for these terms below.¹⁵

- (55) For any $Q \in \mathcal{D}_{\langle\langle d,t \rangle, \langle\langle d,t \rangle, t \rangle\rangle}$, Q is non-directional iff for any $D, D' \in \mathcal{D}_{\langle d,t \rangle}$ such that $\text{MAX}(D) = \text{MAX}(D') \wedge D \cap D' = \{\text{MAX}(D)\}$, $Q(D) \Rightarrow Q(D')$; otherwise, Q is directional.

3.4.4 The positive and MP constructions

The above discussion has given an account of the distribution of evaluativity which has been restricted to sentences with degree quantifiers. This section extends the same principles to positive constructions and MP constructions.

¹⁵For simplicity’s sake, this definition uses the notion of generalized entailment (\Rightarrow) between forms of type $\langle\langle d, t \rangle, t \rangle$. An explicit definition of generalized entailment is in (91) in Section 3.5.6.

The positive construction

The derivation in (11) demonstrated how EVAL can contribute to the semantics of the positive construction, but not that it needs to. The theory as I've spelled it out predicts that each of the expressions in (56) and (57) can have two possible readings.

- (56) Adam is tall.
- a. [-E]: $\exists d[\text{tall}(\text{adam},d)]$
 - b. [+E]: $\exists d[\text{tall}(\text{adam},d) \wedge d > s_{\text{tall}}]$
- (57) Adam is short.
- a. [-E]: $\exists d[\text{short}(\text{adam},d)]$
 - b. [+E]: $\exists d[\text{short}(\text{adam},d) \wedge d > s_{\text{short}}]$

However, the [-E] meanings do not seem to be available. Positive constructions, as we've seen, are reliably evaluative; so much so that we've used them to diagnose evaluativity in other constructions.

Notice that the [-E] meaning mean 'There is a degree to which Adam is tall' and 'There is a degree to which Adam is short,' respectively. These are very uninteresting meanings. What's more, they assert what they presuppose. I've been assuming (with others, like Kennedy, 1999b) that gradable adjectives like *tall* and *heavy* can only be predicated of individuals which have a height and weight respectively. This is reflected in the definition of antonymy in (17). It seems clear, then, that positive constructions are evaluative because their [-E] meanings assert what they presuppose.

There are instances in which this presupposition of positive constructions can make a useful contribution to a more semantically complex assertion, and in these instances, the positive construction is in fact non-evaluative. In languages with 'exceed' comparatives, the positive form can be used to introduce the scale on

which the two arguments are being compared.¹⁶

- (58) Mti hu ni mrefu ku -shinda ule. Swahili (Stassen, 1985, 43)
tree this is big INF -exceed that
'This tree is taller than that tree.'

When used outside the comparative, positive constructions in these languages are evaluative. In (58), the positive construction in the first clause ('This tree is big') contributes to the comparative construction by establishing the dimension of measurement on which the 'exceed' relation is calculated. Despite this, (58) can receive a non-evaluative reading, just like English comparatives. It can be used to discuss the heights of two relatively short trees.

This way of accounting for evaluativity in the positive construction also extends to negated forms of the positive construction: (59) can be used to express the negation of the proposition *Adam is tall*, but it cannot be used to express the negation of the proposition *Adam has a height*.

- (59) Adam isn't tall.

In this respect, (59) is evaluative. We can account for this with the assumption that Adam can't be in the domain of *tall* if he has no height, an assumption which predicts that even a negated positive form can't have a non-evaluative interpretation.¹⁷

¹⁶Thanks to Pam Munroe and Russ Schuh for pointing out the significance of this data. Comparative strategies of this kind have also been recently addressed in Beck et al. (2004), Kennedy (*to appear*) and Sawada (2008).

¹⁷Accounting for (59) also requires the assumption that negation always scopes outside of the existential quantifier contributed by existential closure. Specifically, (59) should denote (60a) but not (60b).

- (60) a. $\neg\exists d[\text{tall}(\text{adam},d) \wedge d > s_{\text{tall}}]$
b. $\exists d[\neg\text{tall}(\text{adam},d) \wedge d > s_{\text{tall}}]$

Although I must leave this as a stipulation, I will point out that such an assumption seems to be required in other domains and for other constructions (see Higginbotham, 2000, for a discussion of this situation in the event domain).

To sum up, positive constructions (as matrix sentences) differ from other degree constructions in that they are always evaluative. This difference is explained by the fact that positive constructions also differ from other degree constructions in that their [-E] meanings assert what they presuppose; as a result, their [+E] meaning is consistently the only one available.

The MP construction

Accounting for the lack of evaluativity in MP constructions is relatively more straightforward. The MP construction *Adam is 6ft tall* is non-evaluative. What accounts for this? One explanation is that, assuming MPs saturate degree variables, in doing so they result a proposition, no longer of the right type to be modified by EVAL.

(61) * $[\text{EVAL} [\text{MP} [\text{Adam is tall}]]]$ (*type mismatch*)

But the definition of EVAL allows an alternative configuration, which must also be ruled out.

(62) $[\text{MP} [\text{EVAL} [\text{Adam is tall}]]]$

In (62), EVAL takes as its argument the set of degrees to which Adam is tall, the result of which is the set of degrees which exceed the standard applicable to Adam's tallness (I'll call this an 'EVALuated' set of degrees).

(63) $\lambda d.\text{tall}(\text{adam},d) \wedge d > s_{\text{tall}}$

Applying the MP *6ft* to the EVALuated set of degrees in (63) results in the following truth conditions for the sentence *Adam is 6ft tall*.

(64) $\text{tall}(\text{adam},6\text{ft}) \wedge 6\text{ft} > s_{\text{tall}}$

This is an evaluative reading of an MP construction; specifically, it asserts that Adam is 6ft tall and that his height exceeds the relevant standard. The theory pre-

dicts that this is a possible interpretation of the MP construction *Adam is 6ft tall*. Just like the non-evaluative constructions above, the fact that *Adam is 6ft tall* does not entail that Adam is tall results from the optionality of EVAL. Presumably, the meaning in (64) is licensed when the hearer has reason to disambiguate the sentence in favor of the evaluative interpretation. MP constructions are therefore not evaluative for the same reasons a comparative construction is not evaluative: it has the potential to receive an evaluative interpretation, but the hearer will presumably not assign it one unless he has reason to do so (to think that Adam is 6ft-tall and that 6ft is significantly tall).

(An alternative way of characterizing the meaning of MPs is that they measure the size of a set of degrees (see for instance McConnell-Ginet, 1973; von Stechow, 1984b; Zwarts, 1997; Schwarzschild, 2005). This construal provides a nice explanation for the incompatibility of negative antonyms and measure phrases: **John is 6ft short* is unacceptable because the set of degrees to which John is short contains infinitely many degrees. In Schwarzschild (2005), adjectives that are modified by MPs must undergo a lexical shift (via the ‘Homonym Rule’) which provides the MP with a set of degrees to modify.

(65) Homonym Rule: $\lambda d \lambda x. \mathbf{A}(x, d) \rightarrow \lambda D \lambda x. D = \{d : \mathbf{A}'(x, d)\}$

This means that, as above, applying EVAL to a [MP Adj] constituent would result in a type mismatch ([MP Adj] would be type $\langle e, t \rangle$), as would applying an MP to an EVALuated set of degrees.)

This section has demonstrated that characterizing EVAL in terms of a degree modifier can account for why and how degree constructions other than the positive can be evaluative. The next two sections go into greater depth about the interaction of evaluativity and the comparative and equative constructions.

3.5 EVAL and other comparison strategies

The EVAL account can be extended to account for other forms of the comparative as well. The discussion here demonstrates that the EVAL account is extensive; it also suggests more explicit ways of conceptualizing semantic competition.

3.5.1 Synthetic/analytic alternations

In languages which employ both a synthetic and analytic strategy for comparison, these constructions differ in their evaluativity.

- (66) a. Adam is taller than Doug. \nrightarrow Doug is tall. *synthetic*
b. Adam is more tall than Doug. \rightarrow Doug is tall. *analytic*

Russian, too, is one of these languages (Matushansky, 2001; Pancheva, 2005, 2006).¹⁸

- (67) a. Germann byl sil'nee čem ego protivnik.
Germann_{NOM} was stronger what_{INSTR} his adversary_{NOM}
b. Germann byl rostom bol'she čem ego protivnik.
Germann_{NOM} was more strong what_{INSTR} his adversary_{NOM}
'Germann was stronger than his adversary.'

As with English, the analytic (67b) is evaluative, but the synthetic (67a) is not.

We can account for these facts with the theory of semantic competition outlined above in conjunction with the assumption that, for predicates which allow either, the analytic comparative is more marked than the synthetic.¹⁹ Their [-E] interpretations are clearly mutually entailing, and so (following the reasoning above), the [-E] interpretation of the more marked form is blocked.

But these data provide one additional interesting complication: because the expressions themselves are synonymous, the [+E] interpretations of both forms are

¹⁸Thanks to Roumyana Pancheva for bringing this data to my attention. See Bobaljik (2007) for a great compendium of comparison strategies cross-linguistically.

¹⁹All of the extensions of the EVAL theory in this subsection require corresponding extensions of markedness theory. I believe that the markedness assumptions I follow here – e.g. that the synthetic form is less marked than the analytic – are intuitive, but I have no basis for making them other than the fact that these assumptions lead to the correct empirical predictions with respect to evaluativity.

mutually entailing. What prevents the [+E] interpretation of the unmarked form from blocking the [+E] interpretation of the marked form (in addition to its [-E] interpretation)? An obvious explanation is that blocking the [+E] interpretation, too, of *Adam is more tall than Doug* would result in its having no meaning whatsoever. We can imagine that there is a precondition on semantic competition that it never renders an expression meaningless. As a result, in the case of total synonymy above, the marked form would always retain the strongest meaning.

3.5.2 Phrasal/clausal alternations

The EVAL account also extends to other optional strategies of comparison. In English, famously, phrasal and clausal comparatives are variants of one another (see Pancheva, 2006, and references therein).

- (68) a. Adam is taller than Doug. *phrasal*
 b. Adam is taller than Doug is. *clausal*

Just as with the synthetic and analytic forms above, these two (synonymous) expressions differ in their evaluativity.²⁰

- (69) a. Adam is taller than Doug. \nrightarrow Doug is tall.
 b. Adam is taller than Doug is. \rightarrow Doug is tall.

And as with the synthetic/analytic forms, we can suppose that this is because their [-E] interpretations are mutually entailing, and that the clausal form is more marked than the phrasal form. Additional evidence for this explanation comes from the surprising fact that the clausal comparative ceases to be evaluative if the tense of the subordinate clause differs from the tense of the matrix clause:

- (70) Adam is taller than Doug was. \nrightarrow Doug was tall.

²⁰Thanks to Nathan Klindedinst for pointing this out to me.

This is presumably due to the fact that this clausal comparative is no longer synonymous with the phrasal comparative *Adam is taller than Doug*, and so does not enter into a semantic competition with it.

3.5.3 *M*-word alternations

Furthermore, the EVAL account can be extended to explain an additional difference between mono- and multimorphemic quantum phrases, which were discussed in Chapter 2. While questions with a positive-polar predicate and a monomorphemic quantum phrase are not evaluative (just like *How tall...* in English), positive-polar questions with multimorphemic quantum phrases are.²¹

- (71) a. Kolku e visoka? [-EVAL]
 QUANTUM is-3sg tall-Fsg
 b. Kolku mnogu e visoka? [+EVAL]
 QUANTUM *m*-word is-3sg tall-Fsg
 ‘How tall is she?’

This outcome is predicted by the EVAL account for questions formed from downward-scalar predicates (the only case for which the two forms are mutually-entailing), assuming that the multimorphemic construction is marked relative to the monomorphemic one.

3.5.4 Indirect comparatives

Kennedy (1999b, 2001) discusses an interesting puzzle in the study of comparatives. The unacceptability of the comparative forms in (72) indicate that it is impossible to directly compare two sets of degrees which differ in their ordering.

- (72) a. ?New York is dirtier than Chicago is clean.
 b. ?The Pathfinder mission was cheaper than the Viking mission was expensive.

²¹Thanks to Slavica Kochovska and Roumyana Pancheva for bringing this to my attention; although I only provide examples for Macedonian, the same is true for Romanian and Bulgarian.

Kennedy refers to the phenomenon in (72) as “cross-polar anomaly”.

However, accepting the prohibition against cross-polar anomaly makes it *prima facie* hard to account for the acceptability of the comparative forms in (73).

- (73) a. My watch is faster than your watch is slow.
b. Will was earlier than Sarah was late.

Intuitively, the degrees being compared in (73) are not degrees of fastness and slowness or earliness and lateness; (73b), for instance, is true if Will’s arrival preceded the meeting time by the same number of minutes that Sarah’s arrival followed the meeting time. Rather than comparing degrees of earliness and lateness, (73b) is comparing degrees of deviation from a standard. These comparatives have been called ‘indirect’ by Bartsch and Vennemann (1972) and Bale (2008), contrasted with the ‘direct’ comparatives discussed in this chapter until now.²²

This reading differs from the one for (analytic) direct comparatives. If *This table is longer than it is wide* was comparing deviations from a standard, it would be true if and only if the degrees to which the table exceeds a relevant standard of longness are more numerous than the degrees to which the table exceeds a relevant standard of wideness. Instead, *This table is longer than it is wide* is true just in case the (e.g.) number of inches to which the table is long is larger than the number of inches to which the table is wide (regardless of whether the table is wide or long).

Referring to standards to discuss the meaning of indirect comparatives makes clear the role that evaluativity could play in an analysis of these forms. Kennedy (1999b, 2001) accounts for the meaning of indirect comparatives by postulating a null operator ZERO which “maps differential degrees [degrees of deviation from a standard – JR] onto degrees with minimal elements that correspond to the zero point of the scale in a structure-preserving way” (Kennedy, 2001, 61). The purpose of such an operator is two-fold: first to account for the intuitive difference

²²Kennedy refers to them as ‘Comparisons of Deviation’ (CODs) and McCawley (1988) refers to them as ‘metalinguistic comparatives’.

in meaning between direct and indirect comparatives, and second to account for the absence of the effect of cross-polar anomaly. The application of the operator ZERO to a set of e.g. ‘long’ degrees results in a set of degrees which deviate from a common endpoint, and are thereby comparable.

There are two problems with such an approach: first, the null ‘ZERO’ operator is (and needs to be) proposed in conjunction with POS (for positive constructions), which as we’ve seen seems to be doing similar work but cannot by definition appear in comparatives. Second, as observed by Bartsch and Vennemann (1972) and Kennedy (1999b), indirect comparatives are evaluative relative to their direct counterparts.²³ This generalization cannot be straightforwardly captured by the ZERO operator.

I’ll briefly propose a new account of indirect comparatives based on EVAL.²⁴ First, it’s important to note that simply applying EVAL to the arguments of a comparative fails to account for the fact that they do not result in cross-polar anomaly.²⁵

- (74) a. Melisa is shorter than Doug is tall.
 b. $\exists d[\text{short}(\text{melisa},d) \wedge d > s_{\text{short}} \wedge \neg \text{tall}(\text{doug},d) \wedge d > s_{\text{tall}}]$

The inability to directly compare degrees of shortness to degrees of tallness is a result of the assumption made in Chapter 1 that a degree is a triple which consists of a point, a dimension, and an ordering. If d is a degree to which someone is short, then it cannot be a degree to which someone is tall. From this point of view, CPA is the result of (one argument of) the comparative being undefined. Note that

²³Bale (2008) argues against this generalization, claiming that *Unfortunately, the view is more beautiful than I am intelligent* can be used in a context in which the view is incredibly ugly to lament the speaker’s lack of intelligence. I agree with Bale’s judgment as well as his assessment that this effect seems pragmatic in nature, and is not the norm. As a result, and following Bale, I’ll leave this counterexample aside.

²⁴See Bale (2008) for a very different approach to indirect comparatives which utilizes a different conceptualization of degrees.

²⁵Kennedy reports comparatives of the form in (74) as instances of cross-polar anomaly, on par with (72), but speakers I have consulted allow an indirect comparison reading of (74). I’ve found that in fact speakers find many instances of cross-polar anomaly acceptable, but only on an indirect comparison reading, which supports the idea that indirect comparison is a sort of repair strategy.

the acceptability of subcomparatives like *A is higher than B is wide* is still predicted under this approach assuming that *high* and *wide* map to degrees of length (but see Büring, 2008, for some complications).

The point illustrated by (74) is that it is not sufficient for avoiding cross-polar anomaly that the two arguments of the comparative are EVALuated sets of degrees. The two sets of degrees which are compared in the [+E] (74b) are merely subsets of the degrees of tallness and shortness which would be in the [-E] interpretation of that sentence in (74a).

Intuitively, what (74a) is comparing is actually the extent to which Melisa’s and Doug’s shortness and tallness deviate from the relevant standards. In order to capture this, we need to postulate a (null) operator whose domain is a(n) (evaluated) set of degrees and whose range is the measure of that set of degrees. This is just the meaning of *m*-words proposed in Chapter 2.

$$(75) \quad \llbracket m\text{-word} \rrbracket = \lambda D \lambda d'. \ell(D) = d'$$

$$(76) \quad \text{LENGTH}(\ell)_{\text{def}}:$$

The length of a bounded interval I with endpoints a and b (where $a < b$) is defined by $\ell(I) = b - a$, where a ‘bounded’ interval is an open, closed, or half-open interval. If I is (a, ∞) , $(-\infty, b)$ or $(-\infty, \infty)$, then $\ell(I) = \infty$.

Given the free distribution of EVAL and *m*-words (and the existence of null *m*-words in English, a phenomenon which admittedly seems relegated to indirect comparatives), we predict the existence of indirect comparatives. The LF of the indirect comparative in *Melisa is shorter than Doug is tall* is as in (77), and its denotation is in (78).

$$(77) \quad [-er [m\text{-word} [EVAL [\lambda d.\text{short}(\text{melisa}, d)]]] \\ [m\text{-word} [EVAL [\lambda d'.\text{tall}(\text{doug}, d')]]]]$$

$$(78) \quad \exists d[\ell(\lambda d'.\text{short}(\text{m}, d') \wedge d' > s_{\text{short}}) = d \wedge \neg \ell(\lambda d''.\text{tall}(\text{doug}, d'') \wedge d'' > s_{\text{tall}}) = d]$$

The truth conditions in (78) hold if and only if the size of the set of degrees of Melisa’s shortness which exceed the ‘short’ standard is larger than the size of

the set of degrees of Doug's tallness which exceed the 'tall' standard. These truth conditions are only defined if Melisa is short in the evaluative sense and if Doug is tall in the evaluative sense, which is consistent with reports about the evaluativity of indirect comparatives.

The indirect comparative interpretation of (78) comes as the result of the presence of two distinct (null) degree modifiers on each argument of the comparative. We can think of the presence of these degree modifiers as some sort of repair strategy: without them, (74) would be an instance of cross-polar anomaly, and would therefore be ungrammatical.

In the context of a cross-polar comparative, too, the presence of this *m*-word isn't sufficient in the absence of EVAL to rescue the expression from unacceptability. Although the set of degrees to which Melisa is short has a closed upper bound (Melisa's height), it has no lower bound. As the measure operator ℓ is defined in (76), this means that the measure of the set of degrees of Melisa's shortness is ∞ . We can reason that this result is either unacceptable semantically or undefined in a way that assures that no comparative with a negative-polar argument will be licensed if that argument contains a null *m*-word but not an EVAL. As a result, a combination of both an *m*-word and EVAL are required to repair a comparative whose matrix and subordinate clauses contain antonyms.²⁶

In some cases when an analytic/synthetic alternation is possible, indirect comparatives differ from direct comparatives by not licensing morphological incorporation (these examples from Kennedy, 1999b, 75, fn.10).

- (79) a. San Francisco Bay is more shallow than Monterey Bay is deep.
b. #San Francisco Bay is shallower than Monterey Bay is deep.

²⁶Notice that the original cross-polar anomaly examples in (72) are instances of cross-polar anomaly precisely *because* they do not seem to have available to them the interpretation of an indirect comparative. This indicates that the repair strategy outlined here is not always available. I have no explanation for why this is the case.

To the extent to which this generalization holds, this data could serve as evidence for the presence of a null *m*-word which could block the formation of the synthetic comparative.

3.5.5 EVAL and *less* comparatives

Finally, the EVAL account can be extended to *less* comparatives; although this extension requires a more nuanced conceptualization of semantic competition.²⁷

- (80) a. Adam is less tall than Doug. [?] → Doug is tall.
 b. Adam is less short than Doug. → Doug is short.

Both of these forms seem evaluative, although speaker judgments vary on the evaluativity of (80a) (hence the question mark). Let's see if the theory makes the right predictions. (I assume the semantics for *less* in (81).)

- (81) a. $[-er] = \lambda D' \lambda D'' \exists d [D'(d) \wedge \neg D''(d)]$
 b. $[less] = \lambda D' \lambda D'' \exists d [\neg D'(d) \wedge D''(d)]$

- (82) Adam is less tall than Doug.
 a. $[-E]: \exists d [\neg \text{tall}(\text{adam}, d) \wedge \text{tall}(\text{doug}, d)]$
 b. $[+E]: \exists d [\neg \text{tall}(\text{adam}, d) \wedge \text{tall}(\text{doug}, d) \wedge d > s_{tall}]$

- (83) Adam is less short than Doug.
 a. $[-E]: \exists d [\neg \text{short}(\text{adam}, d) \wedge \text{short}(\text{doug}, d)]$
 b. $[+E]: \exists d [\neg \text{short}(\text{adam}, d) \wedge \text{short}(\text{doug}, d) \wedge d > s_{short}]$

Focusing on the truth conditions in (82) and (83), we come to the same conclusion as we did for the comparatives with *taller* and *shorter* in (43) and (44): the [-E] meanings of these forms are not mutually entailing, and so neither expressions should be evaluative.

However, this is not the correct characterization of the data in (80). It seems to me that this unexpected result stems from a mischaracterization of the semantic competitors available to each of the forms in (80). When calculating the results of

²⁷Thanks to Bernhard Schwarz for suggesting this possibility and to him as well as Bethany Lochbihler and Hisako Noguchi for their helpful discussion of it.

the competition, we were focusing on a markedness competition relative only to (80a) and (80b). However, there are other forms which seem comparable to these.

- (84) a. Adam is less tall than Doug.
 b. Adam is less short than Doug.
 c. Adam is more short than Doug.
 d. Adam is more tall than Doug.

As we've seen, the [-E] meaning of (84a) does not mutually entail the [-E] meaning of (84b). It does, however, mutually entail the [-E] meaning of (84c). (The same goes for the expressions in (84b) and (84d).) This is illustrated more clearly below.

- (85) Adam is less tall than Doug. \leftrightarrow Adam is more short than Doug.
 a. $\exists d[\neg\text{tall}(\text{adam},d) \wedge \text{tall}(\text{doug},d)] \leftrightarrow$
 b. $\exists d[\text{short}(\text{adam},d) \wedge \neg\text{short}(\text{doug},d)]$
- (86) Adam is less short than Doug. \leftrightarrow Adam is more tall than Doug.
 a. $\exists d[\neg\text{short}(\text{adam},d) \wedge \text{short}(\text{doug},d)] \leftrightarrow$
 b. $\exists d[\text{tall}(\text{adam},d) \wedge \neg\text{tall}(\text{doug},d)]$

We are now ready to provide an account of the distribution of evaluativity in (80). Although the [-E] meanings of the two forms *Adam is less tall than Doug* and *Adam is less short than Doug* are not mutually entailing – and therefore cannot be subject to semantic competition – the [-E] meanings of *Adam is less tall than Doug* and *Adam is more short than Doug*, on the one hand, and *Adam is less short than Doug* and *Adam is more tall than Doug*, on the other hand, are mutually entailing.

I assume (with Rullman, 1995; Heim, 2007) that *less* is semantically complex relative to *more* in the same way that *short* is semantically complex relative to *tall*. It seems reasonable to assume the consequence that *less* is marked relative to *more*. If so, we predict that the synonymy of the two [-E] meanings in (85) and (86) translates to the [-E] meaning of the more marked form *Adam is less short than Doug* being blocked (and this form is thereby evaluative). This is what we saw in (80b).

The two [-E] meanings of the forms in (85) are also mutually entailing, although it's not clear for these expressions which is the more marked. On the one hand, ...*less tall*... is unmarked relative to ...*more short*... because it contains the positive-polar antonym. On the other hand, ...*more short*... is unmarked relative to ...*less tall*... because it contains the positive comparative. Each of these forms is unmarked relative to the other in some capacity, and so the outcome of the semantic competition relies on which type of unmarkedness is most salient. This explanation predicts the fact reported in (80a) that speakers' judgments on the evaluativity of these expressions vary.

Until this discussion of *less* comparatives, we have taken for granted what a legitimate semantic competitor of a given form for the purposes of evaluativity is. This section has shown that a given form could have more than one semantic competitor, which opens up a can of worms for any theory wishing to make calculable predictions based on a semantic competition. In the next section, I propose one reasonable and very useful restriction on possible semantic competitors.

As a side note, there is one additional case in which the right evaluativity prediction comes from considering more than one competitor. It is perhaps surprising that both the equatives in (87) are evaluative:

- (87) a. Baldwin has as many as 30 DVDs.
b. Baldwin has as few as 30 DVDs.

We can confirm that an expression like e.g. (87a) is evaluative due to the relative oddness of ??*Baldwin owns as many as 2 DVDs*.

Given that (87a) is formed with a positive-polar *m*-word, we might expect it to be non-evaluative given its negative-polar counterpart in (87b). However, the [-E] meanings of both equatives are synonymous with the MP construction *Baldwin has 30 DVDs*. This is predicted by the EVAL account, assuming that MP constructions are less marked than equative constructions.

3.5.6 Localizing the competition

The distribution of evaluativity is based on the notion of semantic competition, which is predicated on the belief that markedness can effect possible interpretations in situations where two competing forms would otherwise be synonymous. I specified this version of synonymy as the following: two interpretations p and p' of sentences S and S' are synonymous if p entails p' and vice-versa.

The account correctly predicted that, between e.g. (88a) and (88b), only the former could have a non-evaluative interpretation.

- (88)
- a. Adam is taller than Doug.
 - b. Adam is more tall than Doug.
 - c. Adam is less short than Doug.

It also provided an explanation for the elusive evaluativity of (88c): in a semantic competition with (88a), it is the more marked, and therefore its [-E] meaning is blocked. In a semantic competition with (88b), however, it is the less marked, and therefore its [-E] meaning remains available.

However, the forms in (88b) and (88c) aren't the only ones that mutually entail (88a). There are of course many ways to express this same proposition. (89) contains a few of these.

- (89)
- a. Doug is shorter than Adam.
 - b. Adam is more endowed in the height department than Doug.
 - c. Adam is less vertically challenged than Doug.

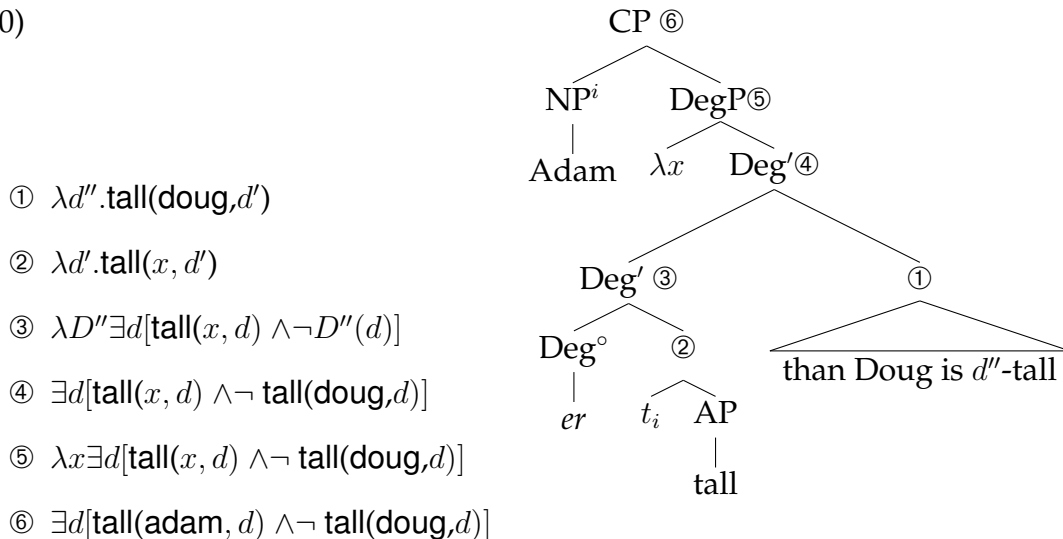
These sentences introduce a series of complications: how can we establish which of e.g. (89b) and (89c) is more marked? And, for those sentences where a relative markedness relationship can be established, what does this say about the evaluativity of these forms? A specific concern is (89a). It differs from (88a) in two ways: the subjects of its matrix and complement clauses are switched, and it contains the negative antonym of the one used in (88a). This last difference indicates that

we should consider (89a) marked relative to (88a). The [-E] meanings of these two forms are synonymous, so the [-E] meaning of the unmarked *Adam is taller than Doug* blocks the [-E] meaning of *Doug is shorter than Adam*, and the above account predicts that the latter (89a) is unambiguously evaluative. This is not the case: (89a), just like other comparatives with *short*, is non-evaluative. Given our assumptions, it seems that (89a) does not count as a semantic competitor for (88a).

There is, I think, an intuition behind why this is so. (88a) and (89a) differ from (88a) in ways other than the polarity of the predicate involved. Because the evaluativity of a construction is dependent on the polarity of a predicate, then, it seems, two forms in a semantic competition should differ with respect to *at most* the polarity of their predicate.

We can incorporate this intuition into the characterization of semantic competition by redefining what it is that is competing. We need the competition to involve the degree quantifier and the polarity of the predicate but nothing else. If we assume a structure in which the quantifier and the predicate form a constituent (Abney, 1987; Larson, 1988; Corver, 1997; Kennedy, 1999b; Grosu and Landman, 1998; Embick, 2007), we can define the competition in terms of this minimal constituent and its denotation.

(90)



This configuration gives us a way of isolating the effects of the degree quantifier and the predicate. We can restrict the semantic competition from equivalent CPs to equivalent DegPs.²⁸ Establishing semantic equivalence between the denotations of DegPs requires a generalized notion of entailment:

$$(91) \quad \text{Generalized entailment} =_{def} \forall f, g \in \mathcal{D}_{\langle\sigma,t\rangle} : f \Rightarrow g \text{ iff } \forall x \in \mathcal{D}_\sigma, f(x) \rightarrow g(x)$$

If we instead define semantic competition in terms of generalized entailment between DegPs, we correctly predict that *Adam is taller than Doug* does not block the [-E] meaning of *Adam is shorter than Doug*, and we correctly predict that *Adam is taller than Doug* does not block the [-E] meaning of *Doug is shorter than Adam*. In both of these cases, the two [-E] DegPs are not mutually entailing in a general sense.

$$(92) \quad \textit{Adam is taller than Doug} \text{ does not block } \textit{Adam is shorter than Doug} \\ \lambda x \exists d [\text{tall}(x, d) \wedge \neg \text{tall}(\text{doug}, d)] \not\Rightarrow \lambda x \exists d [\text{short}(x, d) \wedge \neg \text{short}(\text{doug}, d)]$$

$$(93) \quad \textit{Adam is taller than Doug} \text{ does not block } \textit{Doug is shorter than Adam} \\ \lambda x \exists d [\text{tall}(x, d) \wedge \neg \text{tall}(\text{doug}, d)] \not\Rightarrow \lambda x \exists d [\text{tall}(x, d) \wedge \neg \text{tall}(\text{adam}, d)]$$

To sum up: the account of evaluativity above requires a notion of semantic competition, but this notion is only effective if it's properly constrained. Given that evaluativity is determined partly by the polarity of the predicate in an expression and partly by the polar-(in)variance of the construction, the most obvious way to restrict semantic competition is to define it in terms of a constituent which minimally involves these meanings. The result is a new formulation of semantic competition: two DegPs P and P' are synonymous if the denotation of P generally entails the denotation of P' and vice-versa. As far as I can tell, this additional restriction is successful in accounting for what competitors are relevant in determining the evaluativity of an expression.

²⁸Localizing the competition to the lower Deg', as I did in Rett (2008), precludes the (possible) site of EVAL from the competition, and we would therefore not be able to differentiate between [-E] and [+E] readings.

We've seen that the EVAL account has very broad consequences, and I have been able to detail some of them here. Specifically, it can be directly extended to account for the distribution of evaluativity in synthetic/analytic comparative pairs; phrasal/clausal comparative pairs; and mono-/multimorphemic quantum phrase comparative pairs. The EVAL account – in conjunction with the theory of *m*-words proposed in Chapter 2 – provides a natural analysis of the meaning of indirect comparatives. Finally, it can also be extended to *less* comparatives, although doing so made it clear that we needed a more explicit notion of what counted as a semantic competitor for the purpose of evaluativity.

3.6 The meaning of the equative

The previous section outlined two possible meanings of the equative and presented the EVAL account in terms of the one which is the most dissimilar semantically to the comparative (*as*₂). Here, I'll show that the success of the EVAL account is dependent on this characterization of the semantics of the equative, and present a brief defense of this characterization.

3.6.1 EVAL and the 'at least' reading

First, as I discussed earlier, the relevant difference between a polar-variant quantifier and a polar-invariant one is that a polar-invariant quantifier makes use of the direction of the scale onto which its points are mapped, while a polar-variant quantifier does not (i.e. the former is directional, the latter is non-directional). If the meaning of a quantifier doesn't rely on the direction of the scale onto which its points are mapped, then whether it contains a predicate *A* or its antonym *A'* is of no consequence. The first step here is to determine whether the 'at least' interpretation of the equative patterns in this way with the comparative or with the

‘exactly’ reading of the equative.

The denotation of as_1 , the ‘at least’ equative, is repeated below:

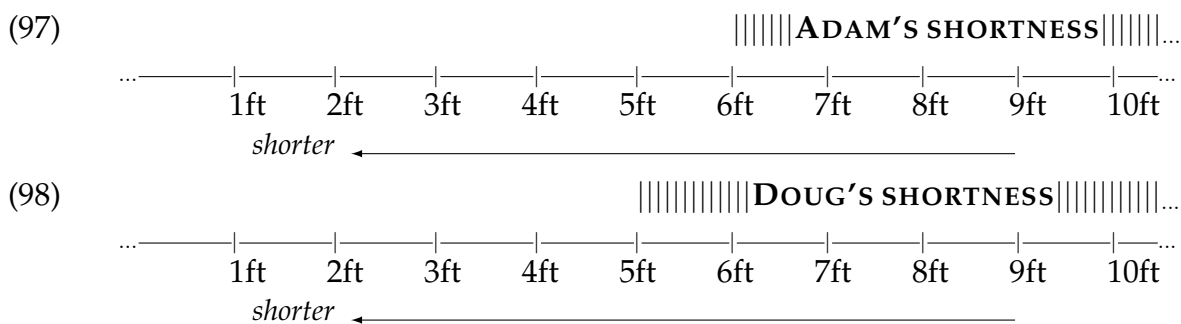
$$(94) \quad \llbracket as_1 \rrbracket = \lambda D' \lambda D'' \exists d [D'(d) \wedge \text{MAX}(D'') = d]$$

This definition yields the following DegP competitors for our sample sentences.

- (95) Adam is as tall as Doug.
- a. [-E]: $\lambda x \exists d [\text{tall}(x, d) \wedge \text{MAX}(\lambda d'' . \text{tall}(\text{doug}, d''))]$
 - b. [+E]: $\lambda x \exists d [\text{tall}(x, d) \wedge \text{MAX}(\lambda d'' . \text{tall}(\text{doug}, d'')) \wedge d'' > s_{\text{tall}}]$
- (96) Adam is as short as Doug.
- a. [-E]: $\lambda x \exists d [\text{short}(x, d) \wedge \text{MAX}(\lambda d'' . \text{short}(\text{doug}, d''))]$
 - b. [+E]: $\lambda x \exists d [\text{short}(x, d) \wedge \text{MAX}(\lambda d'' . \text{short}(\text{doug}, d'')) \wedge d'' > s_{\text{short}}]$

The two [-E] meanings in (95a) and (96a) are not mutually (generally) entailing. Imagine a scenario in which Adam is 6ft tall and Doug is 5ft tall. When adam is filled in for x , the truth conditions in (95a) – which require only that the maximum degree to which Doug is tall is a degree to which Adam is tall – hold in this scenario. However, the truth conditions in (96a) (once x is valued with adam) – which require that the maximum degree to which Doug is short is a degree to which Adam is short – do not hold.

The two scales below represent Adam’s and Doug’s shortness in this scenario.



The maximum degree – relative to the ‘short’ scale – to which Doug is short is 5ft. This is not a degree to which Adam is short, which shows that this is a scenario in which the two [-E] meanings in (95a) and (96a) fall apart.

The import of this outcome is that the ‘at least’ interpretation of the equative patterns with the comparative, rather than the ‘exactly’ interpretation of the equative, on the criteria the EVAL account uses to predict the distribution of evaluativity. Specifically, the [-E] meanings of two as_1 expressions which differ only in the polarity of their antonyms are not mutually entailing.

Intuitively, this is because ‘exactly as P as’ does not rely on the direction of its scale while ‘at least as P as’ does. To allow that the equative has the as_1 ‘at least’ meaning, then, is to lose the above account of the distribution of evaluativity. In the next subsection, I discuss some additional reasons why it’s not a good idea to characterize the meaning of as as ‘at least as’.

3.6.2 Against an ‘at least’ meaning for the equative

Background

Horn (1972) argues that the equative is ambiguous between an ‘at least’ interpretation and an ‘exactly’ reading. (They are sometimes referred to as the ‘weak’ and ‘strong’ reading, respectively, because one is entailed by the other.)

- (99) A: Adam is as tall as Doug is.
B: No, he’s not, he’s taller. *strong reading*
B’: Yes, in fact I think he’s taller. *weak reading*

This data poses the question: what’s the meaning of the equative such that its use results in this ambiguity? I will discuss three possible options:

1. The meaning of the bare equative is the weak ‘at least’ reading (as_1) and it can be strengthened pragmatically to receive an ‘exactly’ interpretation.
2. The meaning of the bare equative is the ‘exactly’ reading (as_2) and it can be weakened pragmatically to receive an ‘at least’ interpretation.

3. The meaning of the bare equative is weaker than either of these meanings (and is strengthened to an ‘at least’ or ‘exactly’ reading by context or by covert instances of *at least* or *exactly*).

Option 1 is the most common approach (Horn, 1972, 2001; Klein, 1980; Kratzer, 2003; Chierchia, 2004, a.o.), in which the ambiguity in (99) is assimilated to scalar implicatures which arise in the context of quantifiers and numerals. This is also referred to as the ‘Neo-Gricean’ approach, because it is based on the assumption that the hearer infers the strong reading ‘A is exactly as tall as B’ from an utterance of the bare equative *A is as tall as B* in most cases because, if A were in fact *taller* than B, the Gricean maxim of quantity requires that the speaker would instead use the comparative.

Option 2, as far as I can tell, has been explored only in Bhatt and Pancheva (2007), where the authors are interested in correlating the syntax of a degree construction with the (non-)conservativity of its degree quantifier. (They ultimately advocate an approach in which the ‘exactly’ reading is a result of late merger of the equative clause, while the ‘at least’ reading is a result of early merger, p. 327.) Option 2 is particularly challenging to implement because, although there are independent instances of meaning being strengthened pragmatically, I know of none in which meaning is weakened pragmatically.

Option 3 is proposed in Schwarzschild and Wilkinson (2002) where – glossing over some differences between the degree semantics used here and their interval semantics – the equative is defined as requiring that the set of degrees denoted by the matrix clause and the set of degrees denoted by the subordinate clause intersect with respect to at least one degree. To get the meanings in (99), Schwarzschild and Wilkinson additionally assume that expressions with the bare equative always contain a covert modifier: either *at least* or *exactly* or *at most*. These modifiers, like their overt counterparts, require that the sets intersect at the maximum degree de-

noted by the complement clause ('at least') or at both maximum degrees ('exactly'). In this account, then, the two readings in (99) are a result of the bare equative being interpreted with two different covert modifiers.

Only Option 1 is incompatible with the EVAL approach, because only the 'at least' equative as_1 is a directional (polar-invariant) quantifier. The 'neutral' definition of the equative proposed in Option 3 is non-directional like its 'exactly' as_2 counterpart. If Adam and Doug share a degree of tallness, then they necessarily share a degree of shortness.

$$(100) \quad \llbracket as_3 \rrbracket = \lambda D' \lambda D'' \exists d [D'(d) \wedge D''(d)]$$

Consequently, this section consists of several arguments against Option 1, or against assigning an 'at least' meaning to the bare equative, in addition to the argument that such a construal of the equative precludes the above EVAL account.

Arguments against Option 1

First, a naïve speaker, when asked, will tell you that the equative means something that amounts to the 'exactly' interpretation. This intuition is reflected in the name of the construction. Imagine that John walks into a hardware store with a piece of wood which is 2ft by 4ft (width by length). He asks the cashier: "Do you have a piece of wood as long as this one?" It would be infelicitous for the cashier to answer "Yes" if he only had pieces of wood which are 5ft-long or longer, which is not predicted by an analysis that assumes John's question is equivalent to "Do you have a piece of wood at least as long as this one?".

Bhatt and Pancheva (2007) present another argument against the neo-Gricean approach (Option 1) which they attribute to Fox (2003). Option 1 appeals to Grice's Maxim of Quantity to produce an inference from 'A is at least as tall as B' to 'A is exactly as tall as B': if the speaker knew that A was in fact taller than B, he would

have used the comparative *A is taller than B* instead of the bare equative. Fox's argument against this reasoning is a reductio: following this logic, we can infer from a speaker's utterance of the equative *A is as at least as tall as B* that the speaker has reason to believe that the corresponding 'exactly' equative is not true. This would indicate that an utterance of an *at least as* equative gives rise to a pragmatic implication that the comparative *A is taller than B* is true in that scenario, which we do not see.

Third, Option 1 implements Horn scales to get at an 'exactly' reading from an 'at least' semantics. It is not at all obvious how such an account could get an 'at most' reading from an 'at least' semantics. But some instances of the bare equative that can in fact receive an 'at most as' reading (these data are adapted from Krifka's 1999 similar argument for numerals).

- (101) a. GM plans to lay off as many as 5,000 people.
b. You too can learn linguistics for as low as \$20 a month!

The equative in (101a) is false under an 'at least as' reading; it is only true in an instance in which GM plans to lay off exactly 5,000 or in an instance where GM plans to lay off fewer than 5,000 people. Similarly, (101b) asserts that you can learn linguistics for *at most as* low as \$20 a month, not lower; the 'at least' reading of this equative would mean that in some cases, you can learn linguistics for less than \$20 a month, and this is not a possible reading of (101b).

This 'at most as' reading of the bare equative is facilitated in sentences with the word *only*:

- (102) John is careful to run only as frequently as his doctor allows.

(102) means that John is careful not to run more times than his doctor allows. In a situation in which his doctor requires that he run no more than 5 times a week, (102) is true only if John runs 5 or less times a week, and is false if the frequency of

his running exceeds this amount.

The ‘at most’ interpretation is not available to all bare equatives, and I am not in a position to provide an account for why this is so. It is sufficient for an argument against Option 1 that it is a substantial challenge to derive an ‘at most’ interpretation from an ‘at least’ semantics and possibly less so for Options 2 and 3.

As I’ve said, only Option 1 is incompatible with the above EVAL proposal. This leaves Option 2 – which I follow above – and Option 3, which proposes a weak ‘neutral’ meaning for the equative. Although Option 3 gets the same results for the distribution of evaluativity as Option 2 has above, there is one reason to think that the maximality operators in the definition of as_2 but not in the definition of as_3 are in the semantic denotation of the equative (see Schwarzschild, 2008, for a review of arguments from von Stechow, 1984 for a maximality operator in the semantics of the equative). This evidence comes from a consideration of the semantic contribution of evaluativity in the equative.

3.6.3 The semantic contribution of evaluativity

By ‘semantic contribution,’ I refer to whether a particular meaning is presupposed by a given expression or adds to its truth conditions. I’ll start by comparing the semantic contribution of evaluativity in positive constructions and equatives and comparatives, and end by accounting for an asymmetry that equatives display with respect to evaluativity.

For all intents and purposes, evaluativity in the positive construction adds to its truth conditions (is not presupposed): it can be directly denied in discourse (103), and it does not project out of the antecedent of a counterfactual (104).

- (103) a. Doug is tall.
b. No, he’s not, he’s actually short.

- (104) If Doug were tall, he would be a basketball player. \nrightarrow Doug is tall.

This appears incongruous with the type of meaning contributed in sentences with overt degree morphology; for these, evaluativity seems to be presuppositional.

- (105) A: Adam is as short as Doug.
 B: #No, he's not, he's actually tall.
- (106) If Adam were as short as Doug, he would not win. \rightarrow Doug is short.

This is especially clear in the equative but is also true for evaluative comparative forms like the ones discussed in Section 3.5 like the clausal *Adam is shorter than Doug is*.

(104) and (105) demonstrate that evaluativity sometimes adds to an expression's truth conditions and is sometimes presupposed. Rather than positing two different EVALs with two different types of semantic contribution, we can imagine an account in which EVAL has one standard semantic contribution which can vary in response to semantic properties of constructions it occurs in. I assume that evaluativity adds to an expression's truth conditions, staying true to its behavior in the positive construction. This approach is particularly viable due to the semantics of the comparative and equative assumed here.

In the case of the expression *Adam is as short as Doug*, its denotation (given the 'exactly' semantics) will look like this:

$$(107) \quad \exists d[\text{MAX}(\lambda d'.\text{tall}(\text{adam},d')) = d \wedge \text{MAX}(\lambda d''.\text{tall}(\text{doug},d'')) \wedge d'' > s_{\text{tall}}) = d]$$

In (107), the evaluativity restriction on d'' is embedded under the maximality operator. This means that the comparison of d'' to s_{tall} is not part of the truth conditions of (107), but rather something that needs to hold in order for the maximality operator to be defined. In this respect, the truth conditions in (107) presuppose that Doug is tall.

Truth conditions of the equative formed from the 'neutral' as_3 , because they

lack such an operator, cannot provide an explanation for why evaluativity is presupposed rather than asserted in the equative. I consider this a good reason to assume that the equative morpheme has the ‘exactly’ as_2 reading rather than the ‘neutral’ as_3 reading.

There is one additional issue raised by the data in (106), which I have hinted at throughout this chapter. Evaluativity in degree quantifier expressions is asymmetrically associated with the subordinated degree clause. While the entailment in (106) holds, the entailment in (108) does not:²⁹

(108) If Adam were as short as Doug, he would not win. \rightarrow Adam is short.

This holds true for evaluative comparatives as well.

(109) If Adam were shorter than Doug is, he would not win. \rightarrow Adam is short.

This why I have been representing [+E] readings as in (110a) (repeated here from (41)), not as (110b) or (110c).

- (110) a. [as [D' Adam is d' -tall] [D'' EVAL Doug is d'' -tall]]
 b. [as [D' EVAL Adam is d' -tall] [D'' Doug is d'' -tall]]
 c. [as [D' EVAL Adam is d' -tall] [D'' EVAL Doug is d'' -tall]]

If the matrix clause in the equative, too, contained an EVAL (as in (110b) and (110c)), we would expect that meaning to either project out of the antecedent of a conditional (in an as_2 analysis), or we would expect that meaning to be asserted (in an as_1 analysis). Given that neither happens, it seems clear that the matrix clause of an equative cannot contain an EVAL, even when it is unambiguously [+E].³⁰

One potential explanation for this fact is that only the subordinated clause is evaluative for reasons of economy. Given the meanings of the comparative and equative morphemes, it seems as though one could reliably infer from the evalu-

²⁹Thanks to Chris Barker for pointing this out.

³⁰The exception, as discussed above, is indirect comparatives, which I’ve argued is the result of a repair strategy.

ativity of the subordinated set of degrees to the evaluativity of the matrix set of degrees, making it unnecessary to have an EVAL in the matrix clause. For example, if Doug is tall to degree d , d is above a standard, and Adam is tall to a degree higher than d , we can infer that Adam is tall to a degree which is above a standard.

However, this explanation does not extend to any comparative in which the two standards could differ. Specifically, the only thing allowing us to make the inference mentioned above is the assumption that Doug and Adam are subject to the same standard of tallness. In the comparative *That elephant is larger than that flea*, we could not similarly infer from the flea's being large-for-a-flea to the elephant's being large-for-an-elephant, and so an economy explanation is in fact not feasible.

A better explanation, suggested to me by Roger Schwarzschild, is that a degree quantifier must be adjacent to the the adjective to which it attaches, and that EVAL interferes in this adjacency. I reproduce the structure of an e.g. comparative below.³¹

(111) [CP Adam [DegP [Deg' *-er* [AdjP tall]]] [CP than Doug is]]

Evidence for the inability is in the distribution of adjuncts in degree constructions like the equative, as the examples below demonstrate.

(112) a. John is as aware [PP of his problems] as Mary.
 b. *John is as [PP of his problems] aware as Mary.

An alternative but equally explanatory theory is in Corver (1997), where he proposes the following underlying structure for degree quantifier constructions.

(113) [DegP too [QP] [AdjP intelligent]]

He posits that Q° must be filled in in the surface structure, and that this requirement is most economically satisfied by the adjective raising from its base-generated

³¹This adjacency restriction doesn't hold for indirect comparatives, where the comparison is of degrees of deviation from a standard rather than gradable degrees of a predicate.

position as the head of AdjP, as in (114).

(114) [DegP too [QP [Q° intelligentⁱ] [AdjP t_i]]]

Under this approach, EVAL would be prohibited from the matrix clause of e.g. a comparative because it would either not suffice as a Q° or would be a less economical Q° than the adjective.

In sum, I interpret the asymmetry data in (108) as demonstrating two facts about evaluativity in degree quantifier expressions. First, evaluativity occurs in the complement but not matrix clause of a degree construction. This is plausibly because it cannot interfere in the linear order between a degree quantifier and an adjective.

Second, the evaluativity of these degree quantifier constructions is presupposed rather than asserted. This can be explained by either the *as*₁ or the *as*₂ analyses of the equative, given that they both have maximality operators in their complement clauses. It cannot be explained by the *as*₃ analysis of the comparative. Given independent reasons for rejecting the *as*₁ analysis (it can't account for the EVAL facts, the neo-Gricean reasoning which allows it to account for the ambiguity of the equative seems flawed, and it can't account for a third 'at most' interpretation of the bare equative), I conclude that the bare equative has an 'exactly' interpretation (*as*₂), although it is not yet clear to me how to capture possible 'at least' interpretations of the bare equative given this assumption.

3.6.4 Evaluativity and 'at least' equatives

There is one final point relevant to the meaning of the equative³²:

(115) Adam is at least as short as Doug. → Doug is short.

³²Thanks to Hans Kamp for bringing this to my attention.

A negative-polar equative form is evaluative *even when* it is overtly modified by *at least*, which (of course) forces the ‘at least’ interpretation.

The fact that (115) is evaluative – especially despite the fact that it presumably does not enter into a semantic competition with *Adam is at least as tall as Doug* – is *prima facie* problematic for the above account. My explanation for (115) draws on the localization of the competition discussed above as well as the fact that there is some reason to think that *at least* scope outside of the propositions which enter into semantic competition for evaluativity.

Superlative modifiers like *at least* can modify propositions ad-sententially, (although *at least* requires for some reason a determiner and intensifier). Geurts and Nouwen (2007) additionally argue based on the semantic behavior of these modifiers that they do so covertly. ((116b) is based on their example (50)).

- (116) a. At the very least, Adam is as tall as Doug.
b. At most, Adam is as tall as Doug.

If this is correct, then modifiers like *at least* take scope outside of the DegP which marks the boundary of the constituent which participates in semantic competition. The localized notion of competition in Section 3.5.6 predicts that the evaluativity of a construction is determined before the construction is modified ad-sententially. Thus, we see no difference in the evaluativity of the constructions in (117).

- (117) a. Adam is as short as Doug.
b. Adam is exactly as short as Doug.
c. Adam is at least as short as Doug.
d. Adam is at most as short as Doug.

Interim summary

This section has explored the possible meanings for the equative in more detail. I have first argued that assigning an ‘at least’ (*as₁*) interpretation to the equative morpheme is at odds with the success of the EVAL account above. I have provided

a few other reasons to think that as_1 is not the right characterization of the equative: the meaning of the equative as it appears discourse-initially, and the fact that bare equatives can have ‘at most’ readings just as they can have ‘at least’ readings.

This left two possible meanings for the equative: Option 2, in which as means ‘exactly as,’ and Option 3, in which as is neutral with respect to either reading. I argued against Option 3 – and therefore in favor of Option 2 – based on the fact that evaluativity in equatives is presupposed rather than asserted. Given that evaluativity is asserted in other constructions, this data can be explained in terms of the as_2 analysis because its evaluativity restriction is embedded under a maximality operator. There is no explanation for the semantic contribution of evaluativity in equatives under the as_3 meaning of the equative.

Finally, I pointed out that overtly modified equatives always behave like their unmodified counterparts with respect to evaluativity, regardless of the semantic nature of their modifier. This is predicted by the localization of the semantic competition proposed in Section 3.5.6, combined with the assumption that such modifiers are ad-sentential ones. The competition which effects the availability of [-E] meanings takes place on a component of an expression’s meaning which includes the degree quantifier but not its modifier.

In sum, a study of the distribution of evaluativity demonstrates that the comparative and equative are directional and non-directional respectively, and the account above can link this behavior directly to a difference in meaning between the two quantifiers. Weakening the meaning of the equative destroys any correlation between the meaning of these quantifiers and their polar-(in)variance, and so a successful competing account which analyzes the equative as having an ‘at least’ meaning should also provide a new explanation for the difference between the equative and comparative in terms of evaluativity.

3.7 Antonyms and scale structure: a typology

Until now, the focus of this chapter has been the distribution of evaluativity among degree constructions with the antonyms *tall* and *short*. With these antonyms, degree constructions display the evaluativity pattern shown in Table 3.1; however, different types of antonyms affect the pattern of evaluativity differently across degree constructions. This is especially clear in the entailment patterns of the comparative constructions, so I will focus on them. The conclusions I reach here logically extend to other expressions containing these antonyms.

- (118) a. Doug is taller than Adam. \nrightarrow Adam is tall.
b. Doug is shorter than Adam. \nrightarrow Adam is short.
- (119) a. This glass is cleaner than that glass. \nrightarrow That glass is clean.
b. This glass is dirtier than that glass. \rightarrow That glass is dirty.
- (120) a. This glass is more opaque than that glass. \rightarrow That glass is opaque.
b. This glass is more transparent than that glass. \rightarrow That glass is transparent.

The data above show three different patterns: 1) comparatives with antonyms like *tall* and *short* are not evaluative; 2) comparatives with antonyms like *clean* and *dirty* have a positive form that is not evaluative, but a negative form that is; and 3) comparatives with antonyms like *opaque* and *transparent* are both evaluative. See the Appendix at the end of the dissertation for a list of antonym pairs and their behavior with respect to evaluativity.

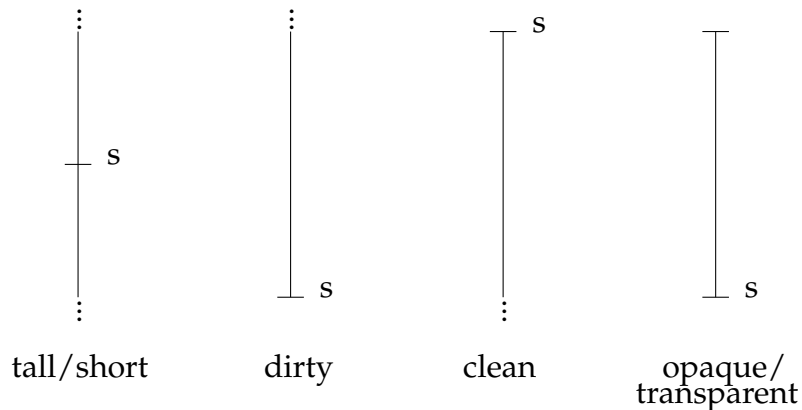
Rotstein and Winter (2004) and Kennedy and McNally (2005) observe that the scales associated with different gradable adjectives differ in structure: they can have only a lower bound, only an upper bound, be completely open or completely closed. This conclusion is based in part by the data below.

- (121) Open scales
 - a. ??perfectly/??slightly tall
 - b. ??perfectly/??slightly short

- (122) Lower/upper closed scales
 - a. ??perfectly/slightly dirty
 - b. perfectly/??slightly clean
- (123) Closed scales
 - a. perfectly/slightly opaque
 - b. perfectly/slightly transparent

In relation to these scale structures, Kennedy (2007) postulates an economy principle: “Maximize the contribution of the conventional meanings of the elements of a sentence to the computation of its truth conditions.” The assumption of this economy principle explains the connection between these predicates’ scale structures and evaluativity patterns: because the scales associated with e.g. *tall* and *short* lack bounds, their standards must be contextually determined. Adjectives associated with bounded scales have natural standards in their endpoints, and these become the value of the standard.

FIGURE 3.1: *Scale structures and standard placement*



If we assume that EVAL has the same optional distribution, the evaluativity patterns demonstrated in (121) through (123) fall out of the different structures of the scales associated with the predicates. Sentences with closed-scale adjectives (123) and lower-bound adjectives (122a) are always evaluative because their standard always corresponds to their lower bound: to be on the scale is to be above the standard on the scale, with or without EVAL.

Sentences with upper-bound adjectives (122b) are never evaluative because their standards are set at their upper bound. To be on the scale is to be below the standard on the scale, with or without EVAL. This demonstrates that a degree-modifier analysis of evaluativity can account for the distribution of evaluativity across all gradable predicates: the distribution of EVAL is held constant, but its effects differ based on the structure of the scale invoked by the sentence.

‘Extreme adjectives’ (Paradis, 1997, 2001), like *gorgeous* and *brilliant*, behave like closed-scale and lower-bound adjectives in that they are evaluative even in comparative constructions. I assume that this is because they are associated with subscales of those scales like ‘pretty’ and ‘smart,’ which are naturally bounded on both sides and therefore they behave like e.g. *opaque*.

A final concern once we address adjectives other than *tall* and *short* was brought to my attention by Veneeta Dayal. In a theory in which semantic competition is based on synonymy – even a ‘localized’ version of synonymy as I adopt above – it’s not just possible for two expressions involving two different degree quantifiers can be synonymous, it’s also possible for two expressions involving two different *adjectives* to be synonymous. For instance, I think many would agree that (124a) and (124b) mean roughly the same thing.

- (124) a. This window is as clear as that window.
b. This window is as transparent as that window.

There are no significant semantic differences between *clear* and *transparent* that I know of. Neither one, for instance, appears to be an ‘extreme adjective’ version of the other. And even if one were to detect a slight difference between these particular adjectives, it’s easy to imagine that there could be a different pair of synonymous adjectives without that difference.

Given this, we find ourselves in another position in which two expressions are synonymous but don’t intuitively serve as competition for one another in terms of

evaluativity (both are evaluative, for instance, in the equative constructions above; see the Appendix for their classification in terms of their scale structure). Furthermore, localizing the competition to the DegP also does not help us here; given that an antonym's meaning is one of two determinants for evaluativity, it would actually be impossible to deal with the differences between the sentences in (124) by better restricting the notion of competition, as in Section 3.5.6.

One explanation is that these adjectives, although synonymous, are not relations between individuals and the same type of degree. Recall that a degree variable d is shorthand for a triple consisting of a point, a dimension, and an ordering on that dimension. The discussion in Section 3.4.2 makes it clear what an ordering is and what two adjectives look like when they differ only in ordering (they're antonyms). But I haven't been explicit about what counts as a dimension, and this is because I consider this an open issue. The adjectives *high* and *wide* are both positive adjectives which intuitively measure the same sort of thing: extension in two-dimensional space. But the dimension invoked by these adjectives nevertheless seems to differ in some way.

It's possible that *transparent* and *clear* differ in this same sort of way: although they seem to be measuring the same sort of thing, the extent to which someone can see through an object, the degrees invoked in their meanings are mapped to two different dimensions, which renders expressions in which they occur not legitimate competitors for one another. Kennedy's (1999b) account of cross-polar anomaly also relies on the assumption that this component of the meaning of the adjective plays a significant role in the meaning and acceptability of degree constructions.

3.8 Conclusions

This chapter has provided an account for the distribution of evaluativity by postulating a null degree operator EVAL which is a function from a set of degrees to a subset of those degrees exceeding a contextually-valued standard. EVAL is an important improvement on POS accounts because it doesn't restrict evaluativity to constructions without overt degree morphology.

I accounted for the distribution of evaluativity in terms of two properties of degree constructions: the polarity of the adjective heading the DegP and the polar-(in)variance or (non-)directionality of the degree quantifier). Essentially, polar-invariant sentences are those for which one form with an antonym *A* does not mutually entail the corresponding form with the antonym *A'*; the lack of synonymy between non-evaluative interpretations of these forms entail that they cannot participate in semantic competition.

Earlier, I mentioned that the POS account has been extended to several accounts of deadjectival verbs and their corresponding event semantics (see among others Vanden Wyngaerd 2001, Piñón 2005, Kearns 2007, Beavers 2008a; 2008b and Kennedy and Levin 2008). Given that this parallel between degrees and events has already been established, I expect that these accounts can be equally well-served by the reconceptualization of evaluativity presented in the EVAL account.

CHAPTER 4

Exclamatives and Degree Properties

4.1 Introduction

The previous two chapters have discussed two degree modifiers and the types of sentences in which they occur. Both modifiers are by definition optional in any degree construction, although other considerations cause their distribution to be more complicated. These considerations resulted in, for instance, EVAL being essentially obligatory in positive constructions.

This chapter is focused on another construction which seems to be reliably evaluative: exclamatives (like *(My,) What desserts Robin bakes!*).¹ These forms are uttered to express surprise on the part of the speaker, but I additionally argue that the content of an exclamative must be evaluative. Accounting for how this is so requires a general understanding of the speech act of exclamation, a discussion of which comprises most of this chapter.

I start by observing key semantic differences between exclamations expressed with declarative sentences (“proposition exclamations” like *Robin baked a blueberry*

¹This chapter is an expansion of work in Rett *to appear*.

pie!) and exclamations expressed with other forms (“exclamatives” like *What desserts Robin bakes!*). First, the latter are subject to what I refer to as ‘the Degree Restriction,’ and so can only be used to express surprise that a certain degree has a certain property. Second, the latter are subject to the what I refer to as ‘the Evaluativity Restriction,’ which requires that their content be evaluative. I argue that the two types of exclamation differ because they are uttered with two distinct illocutionary force operators of exclamation: one whose domain is a proposition, and one whose domain is a degree property.

There have been several connections drawn in the literature between exclamatives and degrees (Bolinger, 1972; Milner, 1978; Gérard, 1980; Carbonero Cano, 1990; Michaelis and Lambrecht, 1996; Obenauer, 1994; Espinal, 1995; Corver, 2000; Villalba, 2003; Castroviejo-Miró, 2006). The account presented here differs in how this connection is captured and formalized. I argue that different types of exclamatives are expressed with different syntactic constructions, but these constructions all have in common the fact that they can denote degree properties. The account here differs further in that I argue that the degree properties they denote must be evaluative in a particular way.

The outline of the chapter is as follows: Section 4.2 discusses speech act theory and what it means to be an exclamation; Section 4.3 argues based on the possible interpretations of *wh*-exclamatives that they are subject to the Degree and Evaluativity Restrictions; Section 4.4 accounts for these differences by postulating two illocutionary force operators, and explores the consequences of the analysis. Section 4.5 extends this account to nominal and inversion exclamatives like (*Oh,*) *The desserts Robin bakes!* and (*Boy,*) *Can Robin bake desserts!*. Section 4.6 reconciles the account of exclamatives here with previous claims that exclamatives can be embedded. The analysis presented here is a direct extension of the theory of EVAL proposed in Chapter 3.

4.2 Speech acts and exclamations

4.2.1 Speech act theory

When uttering a sentence, a speaker performs a speech act, which can be characterized in terms of the communicative function of the utterance (Austin, 1962; Searle, 1969, 1976). A speech act has two components: its semantic content and the illocutionary force with which that content is uttered. For example, *I am going to do it* has a fixed content – its literal meaning – but could be uttered in a variety of different speech acts: promising, threatening, or predicting, etc. It is very important in what follows and generally to keep distinct the notions of a speech act's (syntactic) form, (semantic) content and (pragmatic) illocutionary force.

To discuss properties of exclamations, I'll juxtapose the canonical exclamation in (1a) to its assertion counterpart in (1b).

- (1) a. Wow, Gabe woke up before 8!
- b. Gabe woke up before 8.

There are two differences between (1a) and (1b). The first is reflected in the punctuation of the sentences: the exclamation point in (1a) represents that it is uttered with a certain non-assertoric intonation. This intonation consists of emphasis (which is manifested in lengthening effects) and a falling intonation (Bartels, 1999, p. 263). (1a) also contains an interjection (*wow*), which can be characterized as reinforcing this intonational pattern (Collins, 2004).

The second difference between (1a) and (1b) is that the exclamation expresses surprise on the part of the speaker towards the content of the exclamation. This is the primary characteristic of an exclamation, and it's this characteristic which would cause me to take offense when, while trying on dresses, my boyfriend were to utter, *How very skinny that dress makes you look!*. I'll use 'surprise' to refer to this attitude, although people differ with respect to how they characterize the speaker

attitude expressed in an exclamation: surprise, unexpectedness, viewing the content as exclaim-worthy, etc.

This second characteristic means that exclamations are part of a larger group of expressives like *Oops!* discussed in Kaplan (1999). They are contrasted with descriptives, like assertions. Kaplan explains, “A *descriptive* is an expression which *describes* something which either is or is not the case. Let us call an expression an *expressive* if it *expresses* or *displays* something which either is or is not the case.” I will use the phrase ‘expressively correct’ throughout the chapter to refer to an exclamation which is being uttered (i) sincerely (i.e., the speaker finds its content surprising) and (ii) felicitously (i.e., its content is salient and appropriate, more about this later).

It is important to keep in mind that the sincerity condition is a condition on the speaker’s mental state, so it is possible for a speech act to be uttered insincerely. Searle says, “...[W]here the act counts as the expression of a psychological state, [insincerity is] possible. One cannot, for example, greet or christen insincerely, but one can state or promise insincerely” (Searle, 1969, 65). This, as Kaplan argues, extends to expressives as well, and thereby to exclamations. To lose sight of the fact that exclamations are a type of speech act – and so have this pragmatic component as well as a semantic one – is to confuse the study of their content and discourse contribution.

For instance, in a recent account of exclamatives, Zanuttini and Portner (2003) reject the idea that exclamations express speaker surprise by arguing that they can be felicitous in the absence of sincere surprise. (The syntactic and semantic account of exclamatives presented in Zanuttini and Portner (2003) is, as far as I can tell, accepted as the standard analysis in the literature (see Villalba, 2003, 2004; Ono, 2006; Mayol, 2008, for a variety of work that build explicitly on the Zanuttini & Portner analysis). For this reason, I will frequently use Zanuttini and Portner (2003) to pro-

vide contrast for what I believe are the merits of the analysis presented here.) They make this point using an example like the following. Imagine that you've just met Tori, and you consider her to have impeccable taste. This means that when you go to her apartment for dinner, you expect her house to be impeccably decorated, and it in fact is. An utterance of *Oh, what a nice apartment you have!* or *Wow, you have such a nice apartment!* seems appropriate in this scenario, even though it is false that her apartment has exceeded your expectations or surprised you.

It seems to me that this is an instance of an exclamation which was uttered insincerely in order to fulfill some politeness requirement. This is clear because it would not be inappropriate for Tori, assuming you are being sincere, to infer from your speech act that her apartment surpassed your expectations, and she might consider this a complement.

The bottom line is this: juxtaposing exclamations and their corresponding assertions, as in (1), strongly suggests that exclamations function to express speaker surprise. A theory of the meaning of exclamation would therefore benefit from including considerations of the speaker's attitude in the account. The fact that a speaker can perform such a speech act insincerely comes for free with a theory of speech acts, and can be extended to account for counterexamples like the "Tori" one above.

4.2.2 Types of exclamation

Based on the discussion of (1), we have determined two characteristics of exclamations: they express speaker surprise, and they have non-assertoric intonation patterns. Using these criteria, we can generalize from the proposition exclamation in (1a) to identify three other types of exclamation.

- (2) a. Robin baked a blueberry pie! *proposition exclamation*
 b. What a pie Robin baked! *wh-exclamative*
 c. (Oh,) The pie Robin baked! *nominal exclamative*
 d. (Boy,) Did Robin bake a pie! *inversion exclamative*

I call exclamations like the form in (1a) and (2a) ‘proposition exclamations’ because their content is a proposition. This is a result of the fact that they are expressed with declarative sentences.

I use the term ‘exclamative’ to refer to a subset of exclamations which exhibit specific semantic restrictions, to be discussed in the next section. The exclamations in (2b), (2c) and (2d) all differ from the exclamation in (2a) with respect to these restrictions. (2b) exemplifies a subclass of exclamatives which are headed by *wh*-phrases, which are famously common crosslinguistically (see Elliott, 1974; Espinal, 1995, for examples from Basque, Chinese, Dutch, French, German, Greek, Italian, Romanian, Russian and Turkish). I will focus on *wh*-exclamatives throughout the next section.

The form in (2c) exemplifies a subclass of exclamatives which are expressed with what appear to be definite descriptions. These, too, are relatively common crosslinguistically (see Portner and Zanuttini, 2005, for a discussion of them in Paduan, an Italian dialect); I discuss them in greater detail in Section 4.5. Finally, (2d) exemplifies a subclass of exclamatives whose syntactic form resembles a yes/no question or a declarative sentence with inversion. These are relatively rare crosslinguistically, and I discuss them, too, in greater detail in Section 4.5.

As a side note: it is important to keep in mind the difference between exclamatives and rhetorical questions. Although rhetorical questions can appear to have the same form as exclamatives, they differ in their illocutionary force and in important semantic properties. Sadock (1971, 1974) and Han (2002) present interesting generalizations and accounts of rhetorical questions. (3a) below is an instance of a rhetorical *wh*-question, while (3b) is an instance of a rhetorical inversion question.

- (3) a. Why would she do such a thing?
b. Didn't I tell you that writing a dissertation would be hard?

These expressions, when uttered as rhetorical questions, have the intonation of questions but are nevertheless not information-seeking. In fact, as Sadock and Han suggest, they are actually assertive: (3b) asserts the opposite of its semantic content, that the speaker *did* tell the hearer that writing a dissertation would be hard. (3a), according to Han (2002), also asserts something related to its semantic content: that there is no reason for her to do such a thing.

In this respect, rhetorical questions differ substantially in their meaning from exclamatives. They are also not subject to the restrictions that exclamatives are subject to, the nature of which I discuss below.

4.3 The Degree and Evaluativity Restrictions

I argue in this section that *wh*-exclamatives are subject to two semantic restrictions, the Degree Restriction and the Evaluativity Restriction.² What's particularly significant is that proposition exclamations – which appear to have the same illocutionary force – are not subject to these restrictions, and neither are *wh*-clauses in other contexts (like interrogatives or free relatives). The conclusion I draw from this is that exclamatives and proposition exclamations – despite the fact that they both express speaker surprise – are uttered with two different illocutionary force operators, which I detail in 4.4.

²It should be clear from the discussion in Chapter 3 that a construction cannot be evaluative if it does not make reference to a degree. So it is in principle sufficient to characterize exclamatives just as being subject to the Evaluativity Restriction because this entails that they are subject to the Degree Restriction. However, it is easiest for expository reasons to present each restriction independently, and so I do this here. The discussion of these restrictions is descriptive; in the end, my analysis of exclamatives does not rely on these restrictions being independent.

4.3.1 The Degree Restriction

To determine what the semantic restrictions on a given exclamative is, we need to propose a scenario and then decide whether or not an utterance of that exclamative is expressively correct in that scenario. I claim that *wh*-exclamatives are subject to the Degree Restriction, defined below.

- (4) THE DEGREE RESTRICTION:
An exclamative can only be used to express surprise that the degree property which is its content holds of a particular degree.

I'll argue for this claim by presenting two scenarios which demonstrate two readings of a *wh*-exclamative compatible with the Degree Restriction. I'll then use the same method to show the unavailability of a reading of the exclamative which is *not* compatible with the Degree Restriction.

Scenario 1: The amount reading

Benny is an American, and so you expect him to speak only one language (English). However, you come to find out that, in addition to speaking English, Benny speaks 10 other languages.

You could utter either a proposition exclamation (5a) or a *wh*-exclamative (5b) to exclaim on this fact in an expressively correct way.

- (5) a. (Wow,) Benny speaks 11 languages!
b. (My,) What languages Benny speaks!

Because each of these exclamations are expressing surprise at the amount of languages Benny speaks, I'll refer to this possible interpretation of (5b) as the 'amount reading'.

Such a reading is clearly possible for the proposition exclamation, which contains a numeral corresponding to the amount of languages Benny speaks. However, it is interesting to note that (5b) can have this reading *in the absence of any*

degree morphology.³ This is a very noteworthy property of all exclamatives. Milner (1978) and Gérard (1980), as summarized in González Ruiz (2002), argue that what distinguishes exclamatives from other expressions is their ability to have an extreme-degree interpretation in the absence of overt degree morphology. I'll refer to this as the 'Milner/Gérard Generalization'; it will be a recurring theme throughout the chapter.

It is easy enough given our earlier assumptions to account for the amount reading. In Chapter 2, following a proposal in Cresswell (1976), we saw the need to posit a null quantity operator 'QUANTITY' in English (and other languages) in order to account for other instances in which nouns appear to have (quantity) degree arguments, as in *I ate three pizzas*. It is therefore consistent with our earlier commitments that the *wh*-exclamative in (5b) *does* contain degree morphology, explaining its ability to receive an amount (or quantity) interpretation.

Scenario 2: The gradable reading

Here is another scenario in which a *wh*-exclamative can be uttered in an expressively correct way. Let's say you know Benny is a Romance linguist, and so you expect him to speak only Romance languages. However, you come to learn that he additionally speaks languages from several obscure language families.

You could utter either a proposition exclamation (6a) or a *wh*-exclamative (6b) expressively correctly to express surprise at this fact.

- (6) a. (Wow,) Benny speaks exotic languages!
b. (My,) What languages Benny speaks!

Because each of these exclamations can be used to express surprise at the degree to which the languages Benny speaks are exotic, I'll refer to this possible interpre-

³An astute reader might observe that the amount reading in (5b) is brought out more strongly by the inclusion of an *m*-word, as in *What many languages Benny speaks!*. Given the account of *m*-words presented in Chapter 2, it is not obvious to me why this is so.

tation of (5b) as the ‘gradable reading’.

Again, it is not unexpected that (6a) can be used to express surprise at this fact; it contains the gradable predicate *exotic*. But the *wh*-exclamative can be used in an expressively correct way despite its *lacking* a gradable predicate like *exotic*. Indeed, (6b) can have the following reading:

(7) (My,) What exotic languages Benny speaks!

We can imagine, then, that (6b) can receive a gradable reading by virtue of the fact that it contains some sort of null gradable predicate \mathbb{P} which receives its value from context. Postulating \mathbb{P} or something like it is a necessary evil in accounting for readings like (6b) (Milner, 1978; Gérard, 1980; Gnutzmann, 1975; Gutiérrez-Rexach, 1996; Villalba, 2003; Castroviejo-Miró, 2006).

Support of the proposal of a contextually valued \mathbb{P} comes from the fact that there is some reason to think such a thing is not relegated to exclamatives:

- (8) a. That’s quite a turkey you have there! (read: good, large, crazy, etc.)
b. She bought SOME pizza. (read: delicious, expensive, large, etc.)

The gradable reading and the amount reading have in common the fact that they are ‘about’ degrees: quantity and quality degrees, respectively.⁴ The next scenario demonstrates that this is the extent of the possible readings available to this *wh*-exclamative.

⁴Angelika Kratzer (p.c.) informs me that German exclamatives are disambiguated with respect to the quantity and gradable readings with the prepositions *an* (‘at’) and *für* (‘for’).

- (9) a. Was der **an** Sprachen spricht!
what he at languages speaks
‘What languages he speaks!’
b. Was der **für** Sprachen spricht!
what he for languages speaks
‘What languages he speaks!’

These readings – and the fact that (9b) cannot receive an individual reading (see below) is consistent with the approach here. However, I have no account of why these prepositions effect the exclamatives in the way they do.

Scenario 3: The individual reading

You've heard that Benny speaks two Romance languages in addition to speaking English. You know that Benny's mother is Swiss, and so you assume that these two languages are French and Italian. However, you learn that Benny instead speaks Portuguese and Romanian.

Although a speaker could utter either a proposition exclamation (10a) to express surprise at this fact, it would not be expressively correct to do so with a *wh*-exclamative (10b).

- (10) a. (Wow,) Benny speaks Portuguese and Romanian!
b. #(My,) What languages Benny speaks!

Specifically, a speaker cannot use (10b) to express surprise at the fact that Benny speaks two particular languages.⁵ This reading, unavailable to *wh*-exclamatives, is the 'individual reading'.

Here's another example, to stress the point: a group of friends are playing a card game, and it's Mack's turn to pick a series of pairs from the deck. He picks the ace of spades and the king of diamonds. These cards are shuffled back in and he picks another pair, and again he chooses the ace of spades and the king of diamonds. Again the cards are reshuffled and for a third time, Mack picks the ace of spades and the king of diamonds. In this scenario, (11a) is expressively correct, but (11b) is not.

- (11) a. (Wow,) Mack picked the ace of spades and king of diamonds again!
b. #(My,) What cards Mack picked!

Specifically, (11b) cannot be used to express surprise that Mack picked out those two particular cards.

⁵There is a way to force (10b) to be expressively correct: if one imagines a gradable predicate *P* which both Portuguese and Romanian instantiate in this scenario to a high degree. For instance, if it's clear that Portuguese and Romanian are unique among other Romance languages in being particularly hard for a Swiss person to learn. But this interpretation would be a gradable one.

Although many accounts of exclamatives have stressed a connection between exclamatives and degrees, none have, to my knowledge, argued that non-degree readings are *impossible* interpretations of exclamatives. What's more, some accounts have erroneously reported that individual readings are acceptable. Zanuttini and Portner (2003) demonstrate their theory by arguing that it correctly predicts that *Oh, what things he eats!*, in a certain context, can be used to express surprise that John eats poblano, serrano, jalapeño, güero and habanero peppers. In fact, the utterance of this exclamation is expressively correct only because of the available gradable interpretation: it is used in the scenario they give to express surprise that the degree d to which the things he eats are spicy is high.

Contributing to this confusion is the fact that individuals and kinds, despite not being degrees, can be ordered in a given context with respect to some contextually relevant gradable predicate.⁶ For instance, although science fiction books form a kind of book distinct from romance novels, it seems natural in a given context to order science fiction books relative to romance novels on a salient scale, like 'dorky' or 'sappy'. That this sort of interpretation is available to an exclamation is consistent with the Degree Restriction, especially because, as we have already seen, exclamatives can contain a gradable predicate variable \mathbb{P} which can be valued by context. Thus the use of the exclamation *What books Alex reads!* to express surprise that Alex reads science fiction books does not involve surprise that he reads a particular *kind* of book but rather that the books he reads are particularly \mathbb{P} (perhaps 'dorky').

So to successfully demonstrate that exclamatives are restricted to degrees even when we take kinds into consideration, we must choose a scenario in which there is no salient scale on which we can naturally map the relevant individuals or kinds. I did this with the individual-reading scenario above in (10b): once the class of lan-

⁶Although see Heim (1987); Landman (2006) for arguments that kinds pattern with degrees, rather than individuals, and should thus be analyzed as such.

guages is restricted to Romance, there is no natural scale along which to map the languages Benny could potentially speak. In the context provided for the Zanuttini and Portner (2003) example, the peppers are explicitly mapped onto a scale of spiciness. This means that the exclamative *Oh, what things he eats!* actually expresses surprise at the degrees to which the things he eats are spicy.

Imagine an alternative scenario in which there are two salient types of food: a pile of peppers and a pile of cashews. You were told that Juan would eat the cashews, but he instead eats the peppers. You have no feelings about the relative properties of the piles of food. In such a scenario, the utterance of *What things he ate!*, used to express surprise that he ate one group of things rather than another, is expressively incorrect.⁷

The next two scenarios bolster the claim that exclamatives are subject to the Degree Restriction by extending our purview to exclamatives headed by *wh*-phrases other than *what*.

Scenario 4: The evaluation reading

Without drawing an explicit connection between constituent questions and the syntactic form of a *wh*-exclamative (see Section 4.4.2), we can infer from what *how* can range over in interrogatives to what it might range over in *wh*-exclamatives.

⁷Roger Schwarzschild points out a problem raised by the contextually-valued gradable predicate \mathbb{P} : in any scenario in which the speaker expects *A* rather than *B* (e.g. in the Romance language scenario above), it seems that *A* and *B* could be ordered with respect to each other on a scale *corresponding to the speaker's expectation*. In other words, what prevents the theory from incorrectly predicting that (10b) is expressively correct in the above scenario because the content of the exclamative contains a \mathbb{P} which takes on the value of a gradable predicate 'is *d*-surprising'? At this point, I can only speculate about why such a thing is prohibited: for one thing, 'is *d*-surprising' can't be predicated of *every* salient individual in a scenario (particularly the pile of cashews which you expected Juan to eat), and it might be the case that there is a precondition on the value of \mathbb{P} that all salient individuals must be in its domain. For another, there might be a general prohibition against valuing \mathbb{P} with a speaker-oriented predicate (see Morzycki, 2007, for arguments that these differ in real ways from other predicates).

- (12) How does Buck ride his horse?
a. **manner:** bare-backed, saddled
b. **evaluation:** beautifully, dangerously, clumsily...

The ambiguity of (12) above suggests that *how* in exclamatives could range over either manners or evaluations. Notice that (at least as I've listed them in (12)), evaluations are gradable, where manners are non-gradable. And, as we expect, *how* can range over evaluations in *wh*-exclamatives.

Imagine that you know Buck has never ridden a horse, and so you expect him to ride quite poorly. However, you watch him take his first ride and are surprised that he rides quite well.

- (13) a. Wow, Buck can ride well!
b. (Oh,) How Buck rides his horse!

Both the proposition exclamation (13a) and the *wh*-exclamative (13b) are expressively correct in this scenario.

Notice that (13b) is another instance of an exclamative which contains a null gradable predicate; however, this one is a null adverb, rather than adjective, associated with the verb *ride*. In this scenario, it takes on the meaning 'well' but it could also, in a different scenario, mean 'poorly' or 'unusually,' etc. Thus, (13b) is uttered by a speaker to express surprise at the degree to which Buck rides his horse well.

Scenario 5: The manner reading

As with *what*-exclamatives, the interesting thing about *how*-exclamatives is which interpretations are *not* available. Imagine a scenario in which you know that Buck is a cowboy, and you know that cowboys usually ride their horses bare-backed. You therefore expect Buck to ride his horse bare-backed, as well, and are surprised to see him riding saddled. (Though you have no positive or negative judgments associated with either manner.)

- (14) a. Wow, Buck rides his horse saddled!
 b. #(Oh,) How Buck rides his horse!

The *wh*-exclamative in (14b) cannot be used to express surprise at a particular manner. This is because the salient manner in the context is not gradable. These exclamatives, too, can only express surprise at the fact that a degree property associated with evaluations or manners holds of a particular set of degrees.

The goal of this section has been to argue that *wh*-exclamatives – relative to proposition exclamations – are subject to the Degree Restriction. This means that their only expressively correct use is one in which they express speaker surprise at the fact that a degree property holds of a particular set of degrees. I'll briefly show what should be obvious: this restriction doesn't extend to *wh*-clauses in other constructions. I take this to mean that the Degree Restriction is imposed by the illocutionary force operator used to utter the exclamation rather than the syntactic form used to express the exclamation.

Wh-CLAUSES IN FREE RELATIVES

- (15) I speak [_{RC} what languages Benny speaks]
 ✓ individual reading: Benny speaks Spanish and Japanese and so do I.
 (16) I ride [_{RC} how Buck rides]
 ✓ manner reading: Buck rides saddled/badly and I so do I.

Wh-CLAUSES IN CONSTITUENT QUESTIONS

- (17) I know [_Q what languages Benny speaks]
 ✓ individual reading: I know that Benny speaks Spanish and Japanese.
 (18) I know [_Q how Buck rides]
 ✓ manner reading: I know that Buck rides saddled/badly.

Notice that, in English, the *wh*-phrases which can head acceptable *wh*-exclamatives are actually quite limited. Intuitively, and given what we know about the Degree Restriction, the acceptable *wh*-phrases can be characterized as those which can range over degrees. (Those in (19) cannot.)

- (19) a. *Who he associates with!
b. *When she arrived at the party!
c. *Which people he associates with!
d. *Why she bought that pony!
e. *Where she goes to study!

Although this generalization doesn't hold for all languages, a fact I'll discuss below, it gives further support to the Degree Restriction. Before providing an account for the Degree Restriction, I'll discuss one additional semantic property of exclamatives.

4.3.2 The Evaluativity Restriction

So far we know that, for a *wh*-exclamative to be expressively correct, it has to be uttered sincerely, and it has to be used to express surprise that a certain degree has a certain property. These, however, are not sufficient conditions for an expressively correct utterance of an exclamative: the content of the exclamative must additionally be evaluative.

As discussed in Chapter 3, a sentence is evaluative if the degrees it makes reference to are restricted such that they must exceed a contextual standard (see also Espinal, 1995, 82, who argues that "*wh*-phrases in exclamative sentences. . . are under the scope of an intensifier operator"). As I'll argue, in the context of exclamatives, this translates into a requirement that an exclamative must contain either EVAL or, in some other languages, other degree morphemes which compare degrees to a contextual standard.

Note that this requirement doesn't fall out automatically from the fact that exclamatives are used to express surprise on behalf of the speaker at a degree *d*. Assuming that a relevant contextual standard *s* is calculated in a context and is not directly correlated with the speaker's (immediate) expectations, a speaker can be surprised at *d* despite the fact that *d* is not objectively remarkable (read: does not

exceed the relevant contextual standard). The following scenario exploits this fact.

Scenario 6: evaluativity

Imagine a scenario in which Mia expects Brooks' studio apartment to be 3,000 ft² (or thereabouts) and, upon seeing it, learns that it is actually 1,000 ft². Imagine, additionally, that Brooks' apartment is in Manhattan, where the average studio is only around 500 ft², and in this context, Brooks' studio is big.

(20) #Brooks, how small your apartment is!

In this scenario, an utterance of (20) is not expressively correct, and this is intuitively because Brooks' apartment cannot be considered small. This is despite the fact that the size of Brooks' apartment is lower than Mia's expectation, and so the apartment is in fact smaller than Mia expected.

This generalization holds if we switch the polarity of the predicate. Imagine Mia expects Brooks' studio apartment to be 100 ft². It is actually 200 ft² which (holding fixed the contextual standard used above) makes Brooks' studio quite small in this context.

(21) #Brooks, how very big your apartment is!

Again, (21) is expressively incorrect despite the fact that Brooks' apartment was bigger than she expected it to be.

Morphological evidence: intensifiers in exclamatives

There are two other reasons to think that *wh*-exclamatives are subject to the Evaluativity Restriction. The first comes from English, and the second from Castroviejo-Miró's (2006) discussion of Catalan. First, exclamatives formed with positive-polar adjectives require an intensifier, in contrast to their negative-polar antonyms (this

why I worded (21) the way I did).

Of course, interrogatives can be formed from a question of any polarity.

- (22) a. How tall is Adam?
b. How short is Adam?

While both interrogatives in (22) are acceptable, they differ in their evaluativity: (22a) is non-evaluative, while (22b) is evaluative. Phrased another way, (22a) is ambiguous between an evaluative reading (a denotation that includes EVAL) and a non-evaluative reading (a denotation that does not include EVAL). But (22b) unambiguously denotes a question with EVAL.

Exclamatives, too, are sensitive to the polarity of their predicates. But while a positive-polar interrogative is an ambiguous one, a positive-polar exclamative is an ungrammatical one.⁸

- (23) a. ??How tall that building is!
b. How short that building is!
(24) a. *What many teeth you have!
b. What few teeth you have!

The *what+m*-word exclamatives in (24) are not acceptable to all English speakers, but all of my informants view the (a) sentences as degraded with respect to the (b) sentences. The exclamative in (23a) can be made grammatical with an intensifier: *How very tall that building is!*. (But this is not true for the *what many* question in (24a), which seems to be an idiosyncratic property of *what+AP* forms generally, cf. **What very few teeth you have!*.)

The contrast between (23) and (24) – along with what we already know about the evaluativity of constructions headed *wh*-phrases of positive and negative polarity – suggests the following explanation: it's not just that the content of excla-

⁸Angelika Kratzer informs me that there is no polarity asymmetry in these exclamatives in German; the German versions of both of the exclamatives in e.g. (23) are grammatical. This is further evidence that languages differ in how the evaluativity in how they encode evaluativity in exclamatives (see the discussion of Catalan below).

matives must be evaluative, but that they must be *unambiguously* evaluative. In other words, an expression used to express an exclamative must contain an EVAL.

Underlying this explanation is the assumption that the presence of intensifiers like *very* and *incredibly* in a degree construction signify that that construction is unambiguously evaluative, thus saving an exclamative like (23a). A possible explanation for how this is so is as follows.

If intensifiers like *very* came with a requirement that their semantic argument be evaluative, it would account for their obligatory presence in positive-polar exclamatives. One way this might be so is if intensifiers were modifiers of contextual standards *s*, which are introduced by EVAL. (Contextual standards are *valued* by context, but this doesn't prohibit them being modified or restricted linguistically. In fact, such a thing seems to be the norm: see Rett (2006a).) In this characterization, *very* and other intensifiers are functions from sets of contextual standards *s* to subsets of those standards which are particularly high. Thinking about intensifiers in this way would make it clear why their presence in (23a) and (24a) suffices to make these constructions unambiguously evaluative: the presence of EVAL is a precondition on the presence of the intensifier.

Note that this explanation doesn't entail that constructions *require* an intensifier in order to be unambiguously evaluative. Chapter 3 discussed many unambiguously evaluative ([+E]) constructions which did not contain intensifiers; (23b) and (24b) instantiate such constructions. The generalization is that we can infer from the presence of an intensifier that that expression is (unambiguously) evaluative, but it is not the case that we can infer from a construction's being unambiguously evaluative to its containing an intensifier.

To sum up: exclamatives require that their content be unambiguously evaluative. Forming an exclamative with an expression that would otherwise be ambiguous between an evaluative and a non-evaluative interpretation – like one headed

by *How tall...* – therefore requires the addition of an intensifier to disambiguate the construction.

This explanation works well for exclamatives but needs to be supplemented in order to account for the prohibition of intensifiers in questions which form interrogatives. Abels (2004a), in his discussion of embedded exclamatives, suggests why, citing observations in d’Avis (2002). His conclusion is that “Intensified *wh*-questions have presuppositions that make them incompatible with questioning” (pp. 23-4). He notices that *wh*-questions with intensifiers can function as embedded questions (25a) and as matrix interrogatives (25b) if they occur with a filter for presuppositions (see Karttunen, 1973; Karttunen and Peters, 1979; Heim, 1983).

- (25) a. My physics teacher asked me today **how enormously wide** a river would have to be in order to carry 1,000,000 m³ water/second at 0.3km/h and a width of 10m.
b. If it is already this hot down here on the main floor, **how unbearably hot** must there be up on the balcony?

The above explanation predicts that intensifiers can be used to modify other non-interrogative evaluative constructions, thereby making them unambiguously evaluative. This does in fact appear to be the case (although some intensifiers are more acceptable than others, for reasons I don’t understand).

- (26) a. That man is as incredibly/?very short as his child.
b. Frankie is as incredibly/?very tall as Lamar.

This explanation also extends to comparatives.

- (27) *Frankie is incredibly taller than Lamar.

The difference in acceptability between the intensifier equatives in (26) and the intensifier comparatives in (27) warrants some additional discussion which I do not provide here.

Additional support for this analysis of the meaning of intensifiers (and the ob-

ervation that, in order to modify *s*, they need to be adjacent to EVAL) comes from a problem discussed in Katz (2005). Adverbs derived from predicates like *surprise* behave differently from similar ad-sentential modifiers like *surprisingly*.

- (28) a. Surprisingly, Adam is tall.
b. Adam is surprisingly tall.

(As I mentioned in Chapter 3, Katz refers to *surprisingly* in (28b) as an ‘evaluative predicate’ but this use of the term ‘evaluative’ is distinct from the one used here.) While (28a) can be used to express surprise that Adam is tall, (28b) means that Adam is tall to a surprising degree. We can account for this difference by assuming that *surprisingly* in (28b) modifies the contextual standard *s* introduced by [EVAL *tall*], while *surprisingly* in (28a) cannot because it is ad-sentential (not adjacent to EVAL). I have no explanation for why English requires its intensifiers to be adjacent to EVAL, although it seems likely that this requirement is especially useful for expressions with more than one EVAL (e.g. *That man is short and fat*).

In sum: the fact of the matter is that, in English, exclamatives headed by *wh*-phrases with positive-polar adjectives require intensifiers in contrast to their counterparts with negative-polar adjectives. One way to account for this is by extending to it the (independently observed) generalization that the content of exclamatives must be evaluative. This requires assuming that intensifiers can signify (unambiguously) evaluative content. I have suggested how intensifiers might signify the presence of evaluativity, and discussed the repercussions of such an assumption for other degree constructions.

The final piece of evidence for the Evaluativity Requirement comes from Catalan, and indicates that the Evaluativity Requirement isn’t so much about the presence of EVAL in a construction but about whether or not its degrees are restricted to those which exceed a contextual standard.

Morphological evidence: *quin*-exclamatives in Catalan

Castroviejo-Miró (2006) discusses exclamatives in Catalan headed by the *wh*-phrase *quin*, which (unlike other Catalan exclamatives) must contain one of two degree quantifiers, *tan* or *més*. These examples are hers.

- (29) a. Quin gat tan simpàtic!
 what cat so nice
 What a nice cat!
 b. Quin gos més bonic!
 what dog more nice-looking
 What a nice-looking dog!
 c. *Quin pastís deliciós!
 what cake delicious
 What a delicious cake!

Spanish uses the comparative *más* in exclamatives as well (as does Eastern Arabic; Rice and Sa'id, 1979):⁹

- (30) Qué ratón más grande!
 what mouse more big
 What a big mouse!

Why these two words? Castroviejo-Miró suggests that *més* and *tan* “are degree words that involve a relation between a standard degree and a reference degree,” but they differ in that *tan* uses the relation \geq and *més* uses the relation $>$.¹⁰

- (31) a. $\llbracket \textit{tan} \rrbracket = \lambda G_{\langle e, d \rangle} \lambda x [\text{TAN}(G(x))(d_i)]$
 Where the value of i is given by context and is always high (p. 107).
 b. $\llbracket \text{TAN}(d_R)(d_S) \rrbracket = 1$ iff $d_R \geq d_S$

Castroviejo-Miró's analysis is that *quin*-exclamatives in Catalan must contain a degree operator which provides comparison to a standard. The function of an exclamative is to communicate remarkable content, she reasons, and the inclusion

⁹Thanks to Maia Duguine for this example.

¹⁰Castroviejo-Miró works within a framework in which adjectival predicates are functions from individuals to degrees (Kennedy, 1999b), and so *tan* is of type $\langle \langle e, d \rangle, \langle e, t \rangle \rangle$. In our framework, *tan* would be a function from adjectives to sets of individuals, $\langle \langle e, \langle d, t \rangle \rangle, \langle e, t \rangle \rangle$.

of degree quantifiers that invoke a standard is (for whatever reason) the only way to syntactically signify remarkable content in an exclamative.

It is important to recognize the connection between the meaning contributed by these degree operators and the function of EVAL. If we think of the property of being evaluative as ‘containing an EVAL,’ then the Catalan data is not clearly related to the English data. If we instead think of the property of being evaluative as ‘involving explicit comparison to a contextual standard,’ then we can account for the Catalan data the same way we account for the English polarity facts: in English, EVAL provides this explicit comparison to a standard and in Catalan, *tan* and *més* do.

It is not clear to me why Catalan differs from English in requiring that the morpheme of comparison be phonologically overt in exclamatives, nor why English requires it be phonologically covert in exclamatives. But there is some reason to associate the meanings of the comparative morpheme and EVAL even in English.

- (32) a. Old men like to fish.
b. Older men like to fish.

While there are some subtle semantic differences between (32a) and (32b), it seems clear from the two sentences that the covert EVAL and the overt *-er* both introduce a degree argument that can be valued pragmatically. As a result, it seems natural to associate the obligatory presence of *tan* or *més* in Catalan *quin-*exclamatives to an obligatory presence of EVAL in English exclamatives.

4.4 The analysis

Proposition exclamations and *wh*-exclamatives both express surprise on the part of the speaker, but exclamatives are subject to additional semantic restrictions. Because there is no evidence that these semantic restrictions are a function of the

syntactic forms used to express exclamatives, I propose here that the two types of exclamation are expressed with two different illocutionary force operators: one whose domain is a proposition, and one whose domain is a degree property.

4.4.1 The illocutionary force operators of exclamation

Propositional E-FORCE

It is easy to imagine what the illocutionary force operator used to express a proposition exclamation is like. Proposition exclamations are not subject to any of the semantic restrictions discussed above, and because they are expressed with declarative sentences, it is reasonable to assume that their content is a proposition.

- (33) a. Robin baked a blueberry pie!
b. Jim stole my anorak!

We can thus define the illocutionary force operator of exclamation ('E-FORCE') which is used to express proposition exclamations as follows:

- (34) PROPOSITION E-FORCE(p) is expressively correct in context C iff p is salient in C and the speaker in C finds p surprising.

According to (34), the utterance of an exclamation with content p is expressively correct in a given context if the speaker in that context finds p surprising. This accounts for one factor of an expressively correct utterance of an exclamation; the other is encoded in the restriction that p must be salient in the context. In the "Benny" examples above, for instance, it would be odd to utter *What languages Benny speaks!* a few hours after learning that Benny speaks 11 or particularly exotic languages.

The meaning of the illocutionary force operator in (34) should strike some readers as very similar to the meaning of the embedding verb *be surprised*. Both are functions from propositions to an expression of surprise on the part of the speaker

that that proposition is true. (See Lahiri, 2000, 2002; Abels, 2004a,b, for a more in-depth discussion of the semantics of *be surprised*). The important difference between Proposition E-FORCE and *be surprised* is **how** this meaning is encoded. The illocutionary force operator encodes this meaning in a speech act of exclamation, while *be surprised* encodes it as part of a speech act of assertion. As a result, the complements of *be surprised* that are not exclamations. Exclamations are a type of speech act, characterized by a particular kind of illocutionary force, which is a component of utterances (not e.g. matrix CPs). A sentence like *I am surprised that Robin baked a blueberry pie* does have an illocutionary force, but this force is associated with the utterance as a whole, and it is assertive force. I return to this issue in Section 4.6.

That said, the predicate *be surprised* can provide an important insight into illocutionary force operators of exclamation. Specifically, take the pair in (35):

- (35) a. I am surprised [_{CP} that Blue is so old.]
 b. I am surprised [_{PP} at [_{CP} how old Blue is.]]

Intuitively, one can only be surprised at a proposition. This is made especially clear when we break down the attitude of surprise towards *X* into ‘knows that *X*’ and ‘did not expect that *X*’. This intuition is understandably clouded by the fact that *surprise* can take complements which clearly do not appear propositional. The natural conclusion to draw from this data is that *surprise* in (35b) (or its complement) is associated with a type-shifter which is a function from the content of the complement to a proposition. This reconciles our assumptions about the semantics of *surprise* with the semantic type of its complement in (35b). It also provides some insight into the second type of illocutionary force operator.

Degree E-FORCE

There are two reasons why it's clear that *wh*-exclamatives aren't uttered with Proposition E-FORCE. The first is that it seems odd to think of the *wh*-clauses used to express exclamatives as denoting propositions. The second is that Proposition E-FORCE is not capable of restricting the content of an exclamation to content involving evaluative degrees.

This second point is particularly important, and it's for this reason that most theories of the meaning of exclamatives fail (e.g. Gutiérrez-Rexach, 1996; Zanuttini and Portner, 2003; Sæbø, 2005). If we suppose, as we have been, that the illocutionary force operators of exclamation (rather than some syntactic or semantic aspect of the *wh*-clause) is what's responsible for the Degree and Evaluativity Restrictions, then we need an illocutionary force operator for exclamatives which can differentiate between content about degrees and content not about degrees. This differentiation cannot happen at the propositional level, or at the level of a set of propositions. In order to differentiate between degree and non-degree content, the domain of the illocutionary force operator used to utter exclamatives must be specified in terms of degrees.

To make this point clear, consider the account in Zanuttini and Portner (2003). The authors propose that *wh*-exclamatives are expressed with questions, and their content is therefore a set of propositions à la Hamblin (1973)/Karttunen (1977).¹¹ The denotations of the two questions *How few books Shel owns* and *Who Shel met at the bar* – the former an acceptable exclamation, the latter an unacceptable exclamation – in such a theory are as follows.

¹¹More specifically, in their analysis, the propositions denoted by a question are 1) ordered along some contextually relevant scale (e.g. 'unfamiliarity,' fn. 19 p. 55), and 2) restricted pragmatically in non-exclamative contexts to only those propositions in the common ground. The discourse contribution of an exclamation is to widen the set of denoted propositions from those in the common ground to all those true in the world of evaluation.

- (36) How few books Shel owns
 $\lambda p \exists d [p(w^{\textcircled{a}}) \wedge p = \lambda w \exists X [\text{bks}(w)(X) \wedge \text{owns}(w)(s, X) \wedge \mu(X) = d \wedge d < s_{few}]]$
- (37) Who Shel met at the bar
 $\lambda p \exists X [p(w^{\textcircled{a}}) \wedge p = \lambda w. \text{met-at-bar}(w)(s, X)]$

Although (36) is intuitively a question about degrees and (37) a question about individuals, they both instantiate the same semantic type, $\langle \langle s, t \rangle, t \rangle$. Any illocutionary force operator whose domain is a set of propositions is incapable of discriminating between the content in (36) and the content in (37).

Another consideration in positing an illocutionary force operator for *wh*-exclamatives is that it needs to establish a ‘surprise’ relation between the speaker and a proposition. Unlike with propositional exclamatives, however, the input to the illocutionary force operator for *wh*-exclamatives is not propositional.

At first glance, these might look like incompatible requirements on the illocutionary force operator of *wh*-exclamatives. But we know from looking at the complements of *surprise* in (35) that we need only define this operator in a way that allows for a type-shift from the content of the *wh*-exclamative to a proposition.

- (38) DEGREE E-FORCE (\mathcal{D}) is expressively correct in context C iff \mathcal{D} is salient in C and $\exists d, d > s$ [the speaker in C finds $\lambda w. \mathcal{D}(d)(w)$ surprising].

Although the domain of the E-FORCE operator in (38) is a degree property \mathcal{D} (type $\langle d, \langle s, t \rangle \rangle$), the operator binds the degree and world arguments of the degree property. This results in a proposition $\lambda w. \mathcal{D}(d)(w)$ about which the speaker can be surprised.

The operator in (38) requires that the content of a *wh*-exclamative be a degree property (it would be impossible to form a proposition out of a degree $\langle d \rangle$ or a set of degrees $\langle d, t \rangle$). Degree E-FORCE, when used to utter a form whose content is e.g. an individual property, results in vacuous quantification. (38) also requires that the set of degrees D exceed a relevant contextual standard s . Thus (38) does

not itself add EVAL to the semantic content of the exclamative but rather requires that a degree d which instantiates \mathcal{D} exceed a contextual standard.

There are a few immediate consequences of this analysis which hold true. First, because the illocutionary force operator associated with *wh*-exclamatives binds a free degree argument – and because each utterance can presumably be expressed with only one illocutionary force operator – we predict that expressions uttered with Degree E-FORCE can have at most one free degree argument. This suggests that exclamatives expressed with multiple-*wh*-clauses are unacceptable.

This is in fact the case; Huddleston (1993); Lahiri (2000) make this point for exclamatives like (40a), but we predict these to be ungrammatical for other reasons. The exclamative in (40b), in which both *wh*-phrases range over degrees, is also unacceptable.¹²

- (40) a. *Who married which person!
 b. *How very fat how very many people are!

There is a second immediate consequence of the above account: I posited two exclamatory force operators, one whose domain is a proposition, and one whose domain is a degree property. This predicts that any form which denotes anything but a proposition or degree property cannot be used to express an exclamation. I

¹²Roger Schwarzschild (p.c.) points out that this doesn't rule out multiple-*wh*-exclamatives *per se*, just ones whose *wh*-phrases range over different degrees. Indeed, there is a theoretically possible reading of *How few children kicked how few children!* in which the degree d of quantities of children associated with each *wh*-phrase is one and the same. But I know of no independent evidence that *wh*-phrases in multiple *wh*-constructions in English can co-bind (cf. *wh* copy constructions in some German dialects; see Rett, 2006b, and references therein).

Ono (2006) argues that multiple-*wh* exclamatives are possible in Japanese (p. 71–76):

- (39) John-wa [nante ookina hambaagaa]-o [nante hyaku] tabeta no da roo
 John-NOM what big hamburger-ACC what fast ate EXC
 'How fast John ate what a big hamburger!'

... But reports the following restriction: the two sets of degrees introduced by the two *wh*-phrases must be 'related': "Specifically, the exclamation of Degree A is relative to Degree B, and the exclamation of Degree B is relative to Degree A" (p. 72). This restriction is lifted only for multiple-*wh*-exclamatives of the form 'What A...what A...,' for the same adjective *A*. The phrase *no da roo* marks the illocutionary force of exclamation in Japanese – just as *ka* marks interrogative illocutionary force – and these forms permit only one instance of *no da roo*.

believe this is a correct prediction, and accounts for the unacceptability of e.g. *Who she married!* in English.

The theory here takes for granted that the *wh*-clauses used to express a *wh*-exclamative denote a degree property. I argue in the next section that this is in principle compatible both with the assumption that *wh*-exclamatives are expressed with questions and that *wh*-exclamatives are expressed with free relatives, although I provide some arguments in favor of this second assumption.

4.4.2 The syntactic form of exclamatives

Many studies of exclamatives have made it their goal to determine what particular syntactic class can form an exclamative. Michaelis and Lambrecht frame the issue well: “We say that a sentence type exists when a certain communicative function is conventionally associated with a particular grammatical structure. . . . The issue that concerns us here is whether we can identify an exclamative sentence type for English once we confront the great variety of forms to which someone could intuitively assign an exclamative function” (375). Zanuttini and Portner (2003) approach the issue a different way. Assuming as they do that exclamatives are expressed with questions, they ask: what is it about questions that allow them, so reliably cross-linguistically, to express both interrogatives and exclamatives?¹³

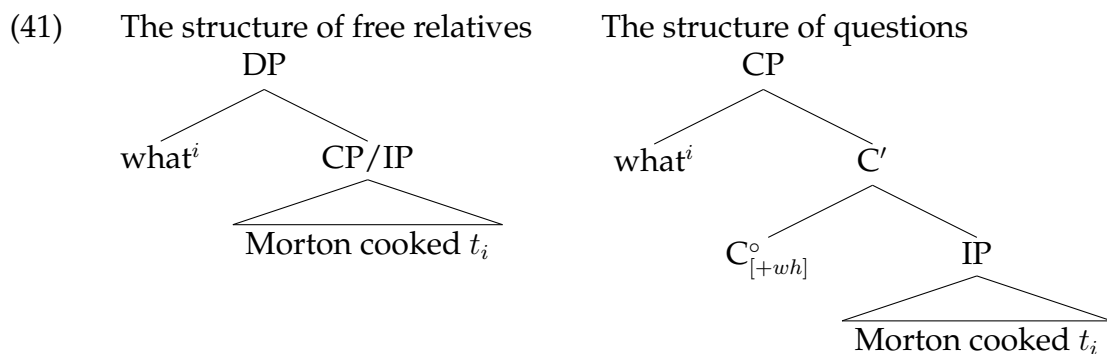
The preceding discussion allows us to switch gears a little bit with respect to the question of which syntactic form(s) can be used to express exclamatives: instead of starting with the syntactic properties of these forms and inferring from there, we can approach the question from a perspective of the *semantic* properties of these forms. Degree E-FORCE puts its own constraints on the forms which can be used to express an exclamative: it must be something which can denote a degree property.

¹³Zanuttini and Portner make this assumption about questions despite observing several syntactic parallels between the syntactic forms of exclamatives and free relatives (pp. 60, 62, 65) in Paduan and Italian. I will present some of their evidence below, using it to draw the opposite conclusion.

This constraint is actually more nebulous than it appears; as we've already seen, there are things which denote degree properties in constructions other than exclamatives, and things which appear to denote degree properties only in exclamatives. This is the Milner/Gérard Generalization: a core property of exclamatives is their ability to receive a degree interpretation in the absence of degree morphology. I will return to this issue in Section 4.5.2, where I argue that even inversion exclamatives denote degree properties, and discuss how this might be so.

Focusing for now on *wh*-exclamatives: if our goal is to determine which type of syntactic construction can be used to express *wh*-exclamatives, we have two plausible options: constituent questions and free relatives. Before addressing these options, I'll briefly discuss what I assume to be the syntactic differences between the two forms.

Free relatives and questions both have in common the fact that they contain a *wh*-operator (a morphological property) and a corresponding gap (a syntactic property) (Caponigro, 2003, 10). Following Groos and van Riemsdijk (1981); Grosu and Landman (1998), among others, I assume that a relative clause is a construction whose *wh*-phrase raises to the specifier of a CP-selecting DP, while a question is a construction whose *wh*-phrase raises to (a [+*wh*]) spec,CP.



The two constructions can appear identical, as (42) shows, but they differ in that questions instantiate the category CP, while free relatives instantiate the category DP (those headed by e.g. *what*) or PP (those headed by e.g. *where*) or DegP

(those headed by e.g. *how many*). Accordingly, free relatives have the distribution of DPs, and (embedded) questions have the distribution of CPs (43) (Baker, 1995; Caponigro, 2003).

- (42) a. Milton ate [_{DP} what Morton cooked].
b. Milton wondered [_{CP} what Morton cooked].
- (43) a. Milton ate [_{DP} pizza].
b. Milton wondered [_{CP} whether Morton cooked pizza].

Besides this substitution test, *wh*-phrases in questions can contain the words *else* and *the hell* in contrast to free relatives (Ross 1967 and McCawley 1988, respectively; from Caponigro 2004).

- (44) a. Milton *ate/wondered what else Morton cooked.
b. Milton *ate/wondered what the hell Morton cooked.

Are exclamatives expressed with questions?

There is one systematic syntactic difference between the *wh*-clauses which form interrogatives and the *wh*-clauses which form exclamatives: the former demonstrate subject-auxiliary inversion, the latter do not.

- (45) a. How little money can you live on?
b. (My,) How little money you can live on!

Assuming that this difference can be explained by appealing to pragmatic differences in the two types of speech acts, many have found it tempting to think of *wh*-exclamatives as being expressed with questions (Elliott, 1974; Grimshaw, 1977, 1979; Gutiérrez-Rexach, 1996; Zanuttini and Portner, 2003).

Those analyses which make explicit assumptions about the semantics of questions have subscribed to either the theory of questions put forth in Hamblin (1973) and Karttunen (1977) – where they denote a set of propositions, type $\langle\langle s, t \rangle, t \rangle$ – or (as in Gutiérrez-Rexach, 1996) the theory in Groenendijk and Stokhof (1984),

where questions denote functions from worlds to propositions (type $\langle s, \langle s, t \rangle \rangle$). Neither of these are compatible with the above assumption that the content of *wh*-exclamatives is a degree property, or even that they are subject to the Degree Restriction.

However, Groenendijk and Stokhof (1989) proposes a theory of questions based on a reconceptualization of what it means to be a complete answer to a question, and such a theory is consistent with the idea that exclamatives are formed from questions and the theory of Degree E-FORCE above. In Groenendijk and Stokhof (1984), they attribute this type of approach – a ‘categorial approach’ – to earlier work by Hull (1975) and Hausser (1976). Notice that there are two possible answers to the question below:

- (46) Q: Which book did you read?
A: I read *Birds of America*. (long answer)
A': *Birds of America* (short answer)

Both the long and short answer are felicitous answers to the question *Q*. Many accounts prior to Groenendijk and Stokhof (1989) – e.g. Hamblin (1973); Karttunen (1977) – considered the long answer to be the true (‘complete’) answer to a question, and the short answer to be essentially an elided version of the long answer, denoting the same thing (i.e. a proposition) at LF.

Groenendijk and Stokhof (1989) instead consider the short answer to be the true answer; instead of denoting sets of propositions, then, a constituent question denotes an *n*-place relation. *n* corresponds to the number of *wh*-phrases in a question, and e.g. a question headed by *who* is a 1-place relation from individuals, type $\langle e, \langle s, t \rangle \rangle$. The generalization they give is this: “The syntactic category and the semantic type of interrogatives are determined by the category and type of their characteristic answers” (p. 424). This, of course, extends straightforwardly to questions headed by degree *wh*-phrases, which denote degree properties.

In a general version of this proposal, then, the denotation of the question *What toppings are on the pizza?* is the (one-place) property in (47a), and the denotation of the question *How many pizzas did Evans order?* is the (one-place) property in (47b).

- (47) a. $\lambda x \lambda w. \text{toppings}(w)(x) \wedge \text{on-pizza}(w)(x)$
 b. $\lambda d \lambda w \exists x [\text{pizza}(w)(x) \wedge \text{order}(w)(\text{evans}, x) \wedge |x| = d]$

As Groenendijk and Stokhof (1989) argue, a complete account of the semantics of questions must also include type-shifters to extend to questions in embedded contexts, when combined in conjunctions or disjunctions, or accounting for entailment relations between questions. This requires a semantic type of $\langle s, t \rangle$ or $\langle \langle s, t \rangle, t \rangle$ or higher.

The above arguments about the Degree Restriction indicate that their content is a degree property. If exclamatives are in fact expressed with questions, this requires a semantics of questions by which they can denote degree properties. The account in Groenendijk and Stokhof (1989) provides such an analysis. However, there is one other possibility: that exclamatives are expressed with free relatives.

Are exclamatives expressed with free relatives?

Free relatives are one type of relative clause which are headed by *wh*-phrases (48b). Another type of relative clause is a headed relative, where a relative clause is embedded under a head noun (48a).

- (48) a. I will eat [_{DP} the things [_{RC} (which) you cooked]] headed relative
 b. I will eat [_{RC} what you cooked] free relative

Headed relative clauses appear to denote properties (see Jacobson, 1995; Dayal, 1996; Caponigro, 2004, and references therein). Free relatives, in contrast, are typically thought of as denoting the maximal entity which satisfies a relevant property *P* (type $\langle d \rangle$ in the case of a degree relative, $\langle e \rangle$ for an individual relative). If free relatives do in fact denote maximal entities, we would have no way of explaining

how they might be used to express an exclamation.

However, the idea that *wh*-exclamatives are expressed with free relatives could be made compatible with Degree E-FORCE if we think of the ‘maximal entity’ reading associated with free relatives as derived from the property-denotation of a headed relative via a type-shifter (Jacobson, 1995, a.o.). In the context of a *wh*-exclamative, this explanation would go, a free relative would keep its property denotation, and Degree E-FORCE could in fact be used to utter a free relative.

There are a few reasons to think that *wh*-exclamatives are expressed with free relatives. Many involve languages in which questions and free relatives differ morphosyntactically; in any such language I know of, exclamatives pattern in their morphosyntax with free relatives rather than with questions. I’ll present some data here, cautioning that a thorough crosslinguistic study of these constructions is necessary to give any serious weight to this claim.

A. *What*+NP_{PL} can range over degrees in exclamatives and relative clauses, but not in interrogatives (Carlson, 1977; Heim, 1987).

(49) Mike put [_{RC} what things he could] into his pockets.

- a. #individual reading
- b. amount reading¹⁴

(50) It would take days to drink [_{DP} the champagne [_{RC} they spilled that evening]]

In (49), the relative clause is headed by a *what*+plural noun phrase and, in this context, such a phrase can only receive an amount reading. That is, (49) cannot be used to mean that, for every individual *x*, if Mike could put *x* in

¹⁴Roger Schwarzschild (p.c.) points out that (49) can also receive a gradable reading. In a situation in which Mike is confronted with stones of various temperatures – where some stones are so hot that Mike cannot touch them – (49) can mean the following: for the every degree of hotness *d* st. Mike can put *d*-hot stones in his pocket, Mike put *d*-hot stones in his pocket. This reading seems to be available for any gradable property that could realistically affect whether or not Mike will put an object with that property in his pocket (e.g. for ‘big’ or ‘sharp’ but not for ‘shiny’ or ‘multi-cultural’). The availability of gradable readings for these ‘amount relatives’ strengthens the parallels between exclamatives and free relatives.

his pocket, he did (the individual reading). It can only be used to mean that, given *d*, the maximum amount of objects Mike could fit into his pockets, Mike put *d*-many objects into his pockets.¹⁵ (50) shows that headed relatives, too, can function as amount relatives.

This interpretation of *what*+NP_{PL} clauses is not possible in interrogatives:

- (51) Q: What languages do you speak?
A: English and Spanish
A': #Two

There are two factors which complicate the parallel between amount relatives and *wh*-clauses in *wh*-exclamatives. First, as pointed out in Grosu and Landman (1998), amount relatives have a very restricted distribution; they almost always require “contextual triggers” like modals and generics (p. 133). The distribution of degree-*what* in exclamatives is not so restricted.

Second, although I have not yet addressed them, English permits exclamatives which are headed by *what a*+NP_{SG} clauses.

- (52) a. What a lush that girl is!
b. What a nerd he is to spend so much time reading the dictionary!

This morphology is specific to exclamatives in English. It is not unusual for languages to have one or two ‘*wh*-phrases’ whose distribution is restricted to exclamatives. (53) shows two examples of such phrases in French; (53a) is an example from written literary style from Viviane Déprez (p.c.) and (53b) is from Elliott (1974). (54) is a Norwegian example from Sæbø (2005).

- (53) a. Combien peu de gens ont su faire cela!
QUANTUM few of people has-3pl know to-do that
‘How few people knew to do that!’

¹⁵Curiously, amount relatives, too, can contain an *m*-word: *Mike put what many things he could into his pockets*. As I suggest in footnote 3, this indicates that *what* is ranging over quantities. This observation seems to strengthen the assumption that the *what*+NP phrase in exclamatives and the *what*+NP phrase in amount relatives are related.

- b. Comme elle est belle!
 how she is-3sg beautiful
 'How beautiful she is!'

- (54) Så lite (som) han forstår!
 so little that he understands
 'How little he knows!'

The immediate problem with *what a*+NP_{SG} clauses is that they are not permissible in relative clauses (**Mike put what a marble he could into his pocket*). It seems like an ideal account would provide the same explanation for the acceptability of *what*+NP_{PL} and *what a*+NP_{SG} clauses in exclamatives.

B. Zanuttini and Portner (2003) argue that Paduan *wh*-exclamatives pattern with Paduan relative clauses (rather than questions) in their ability to scope high in the CP (p. 60):

- (55) a. A to sorela, che libro vorissi -to regalar -ghe?
 to your sister, which book want -CL give -her
 'To your sister, which book would you like to give as a gift?'
 b. *Che libro, a to sorela, vorissi-to regalar-ghe?
- (56) Che bel libro, a to sorela, che i ghe ga regalà!
 what nice book, to your sister, that CL have her given
 'What a nice book, to your sister, they gave her as a gift!'

The word order in the exclamative in (56) is unacceptable in an interrogative (55b) but is obligatory in relative clauses in Paduan (Rizzi, 1997; Zanuttini and Portner, 2003).

C. Hebrew exclamatives and free relatives – but not questions – require an overt complementizer (Sharvit, 1999, p. 320 and Roger Schwarzschild, p.c.).

- (57) a. Dan berer ma (*še) karati.
 Dan found-out what (*COMP) read-1p
 'Dan found out what I read.'
 b. Dan kara ma *(še) ani karati.
 Dan read what *(COMP) I read-1p
 'Dan read what I read.'

- c. Ma *(še) ani karati
 how *(COMP) I read-3sg
 'What I read!'

This indicates that, at least in Hebrew, *wh*-exclamatives are expressed with free relatives rather than with questions.

- D. The types of *wh*-phrases permitted in exclamatives in a given language seem to co-vary with those permitted in free relatives.

The relevant observation here is that, as reported in Zanuttini and Portner (2003), Paduan and Italian differ from English in terms of which *wh*-words can head an exclamative.¹⁶ While English allows only *how*, *what* and *how many/few* – described earlier as only those which can range over degrees – exclamatives in Italian can allegedly be headed by any *wh*-phrase except for *why* (although Zanuttini and Portner only provide the example in (58)).¹⁷

- (58) Chi inviterebbe per sembrare importante!
 who would-invite for to-seem important
 'The people he would invite to seem important!'

First, it's important to point out that (58), despite being headed by *chi* ('who'), can only receive a degree interpretation. In that respect, it's just like the English gloss above, headed by *the people*. This means that accounting for this difference amounts to accounting for the difference between the distribution of e.g. *chi* and *who*.

The distributional differences between English and Italian with respect to these *wh*-phrases are mirrored in free relatives (Caponigro, 2003, 2004). Al-

¹⁶As far as I can tell, Paduan and Italian behave alike in the relevant distribution of *chi* in both exclamatives and free relatives. I will therefore discuss only Italian here, as I have no access to speakers of Paduan.

¹⁷Castroviejo-Miró (2006) reports that these sentences are actually instances of rhetorical questions (pp. 11–12, see Sadock, 1971, 1974; Han, 2002, for a discussion of the semantics of rhetorical questions), but my Italian informants report an available exclamative reading. This reading can be prompted with the interjection *guarda* ('wow!,' 'look!'), just as in English. Thanks to Flavia Adani for this suggestion.

though *chi* can head existential free relatives in Italian, *who* cannot do so in English.

- (59) a. C'è chi dice sempre sì
that who say-3pl always yes
'There are people who always say yes.'
b. *There are who always say yes.

I have no account of what leads to this distributional difference between e.g. English *who* and Italian *chi*. The relevant lesson, as I see it, is that the fact that differences between *wh*-phrases in English and Italian *wh*-exclamatives parallel differences between them in free relatives. This suggests that the syntactic forms underlying each are closely related.

To sum up: the goal of the analysis above was to account for key semantic differences between *wh*-exclamatives and other types of exclamation. Providing such an account resulted in a semantic (rather than syntactic) characterization of exclamatives. As a result, the only restriction this analysis places on what type of syntactic form can be used to express an exclamative is that it must be able to denote a degree property.

The discussion in this subsection demonstrated that it is possible that exclamatives are expressed with questions or that they are expressed with free relatives. If it turns out that *wh*-exclamatives are expressed with questions, then the above analysis provides a strong argument for the Groenendijk and Stokhof (1989) analysis of constituent questions as *n*-place relations. If, on the other hand, *wh*-exclamatives are expressed with free relatives, we have reason to believe that the maximality exhibited in non-exclamative free relatives is somehow derived from a property denotation.

More importantly, the E-FORCE analysis could be interpreted as one for which the distinction between constituent questions and free relatives is irrelevant. If both questions and free relatives potentially denote properties, then perhaps there

are other explanations for some systematic morphosyntactic differences between the two types of constructions.

4.5 Nominal and inversion exclamatives

I've focused on *wh*-exclamatives so far to simplify the presentation of the Degree and Evaluativity Restrictions. Now that we have a theory of Degree E-FORCE, it's interesting to see how it extends to the two other types of exclamatives, nominal and inversion exclamatives.

4.5.1 Nominal exclamatives

Nominal exclamatives are those expressed with definite DPs.

- (60) a. (Oh,) The height of that building!
b. (Oh,) The places you'll go!
c. (Oh,) Her way of doing things!

It's clear that indefinite DPs cannot form exclamatives, as shown in (61). To confuse the issue, there are also additional restrictions on the type of *definite* DPs that can express exclamatives, as shown in (62).

- (61) a. *(Oh,) A place you'll go!
b. *(Oh,) A way she has of doing things!
- (62) a. *(Oh,) The height of John!
b. *(Oh,) The height of the building on the corner of Orchard & Houston!
c. *(Oh,) Mary's way of doing things!

Given the lack of semantic difference between especially (60c) and (62c), I believe that the examples in (62) demonstrate that the forms of nominal exclamatives are subject to some intonational requirements. It seems as though (62c) is unacceptable as a result of a requirement that the first syllable of an exclamation must be unstressed, while (62a) and (62b) are unacceptable as a result of a requirement that

the form used to express an exclamative must be at least 5 but no more than 8 syllables. It's likely that these restrictions are imposed by the illocutionary force of exclaiming, although I should note that it does not appear to restrict the length of *wh*-exclamatives or inversion exclamatives.

What's important for our purposes is that nominal exclamatives are subject to the Degree and Evaluativity Restrictions. Recall the three scenarios with respect to Benny's language comprehension presented to show that the *wh*-exclamative *What languages Benny speaks!* can only have degree readings (Scenarios 1, 2 and 3). The nominal exclamative in (63) patterns with its *wh*-exclamative counterpart in its available readings in these scenarios.

- (63) (Oh,) The languages Benny speaks!
- a. #individual: surprise that Benny speaks Portuguese and Romanian
 - b. amount: surprise that Benny speaks a large number of languages
 - c. gradable: surprise that the languages Benny speaks are \mathbb{P} to degree *d*

That is, (63) can only be used to express surprise at either the number of languages Benny speaks or the degree to which the languages he speaks are some predicate \mathbb{P} . (Notice that, just as with *wh*-exclamatives, this predicate can be overt, as in *Oh, the exotic languages Benny speaks!*, making the exclamative unambiguous.)

Nominal exclamatives are subject to the Evaluativity Restriction, as well. Imagine a scenario in which Linda expects the amount of children Leon has to be particularly high (or low). However, she discovers that Leon has 3 children, which is roundly regarded as an average number of children.

- (64) #(Oh,) The amount of children Leon has!

Despite the fact that the number of children Leon has was lower than (or higher than) Linda's expectation, Linda's utterance of (64) is not expressively correct because the amount of children Leon has is not significantly high or low relative to the corresponding contextual standards. This demonstrates that nominal exclama-

tives, too, are subject to the Evaluativity Restriction.

The significance of this is that nominal exclamatives must pattern with *wh*-exclamatives, rather than with proposition exclamations, in being uttered with Degree E-FORCE. The consequence of this reasoning is that the content of a nominal exclamative is a degree property.

We can, as before, connect this result to the syntactic form of an exclamative in one of two ways. If nominal exclamatives are expressed with concealed questions, we can account for their semantic restrictions by analyzing them as we did constituent questions, à la Groenendijk and Stokhof (1989). On the other hand, if nominal exclamatives are expressed with headed relative clauses, they can denote degree properties by virtue of the fact that headed relative clauses denote properties.

As for the concealed question possibility: recent accounts of concealed questions have argued that they are not in fact restricted to definite DPs (pace Baker, 1970; Heim, 1979), but can be formed from any other kind of DP (Nathan, 2006; Frana, 2006).

- (65) a. I know [_{CQ} the capital of France.]
b. I know [_{CQ} every capital.]
c. I know [_{CQ} a capital of a European country.]

If this is in fact the case, it will be hard to account for the fact that nominal exclamatives are restricted to definites, while concealed questions are not.

As for the headed relative clause possibility: Carlson (1977) observes that amount relatives can only be headed by definites (p. 536).

- (66) a. The/What/*Some headway Mel made was unsatisfactory.
b. *(Oh,) The height of some buildings!

The fact that (66b) is unacceptable indicates that nominal exclamatives cannot contain indefinites at all. This parallel between nominal exclamatives and relative

clauses suggests that the two restrictions are related, and possibly that nominal exclamatives are formed from headed relative clauses.

4.5.2 Inversion exclamatives

Inversion exclamatives are those which are expressed with declarative sentences that display subject-auxiliary inversion.

- (67) a. (Boy,) Does she have a lot of money!
b. (Boy,) Can Meg cook!

Inversion exclamatives display two interesting properties: first, their content is arguably a degree property, as they are subject to the Degree and Evaluativity Restrictions. Second, they exhibit some unusual morphosyntactic properties in contrast to yes/no questions and in some cases even in contrast to *wh*-exclamatives. I'll discuss these properties in turn and then propose an account of inversion exclamatives which explains both.

Inversion exclamatives and the Degree/Evaluativity Restrictions

There are three possible interpretations of the inversion exclamative in (68).

- (68) (Boy,) Can Robin bake pies!
a. amount: surprise that Robin can bake a large amount of pies
b. gradable: surprise that Robin can bake pies that are \mathbb{P} to degree d
c. evaluation: surprise that Robin can bake pies ADV to degree d

While we expect that (68) cannot be used to express surprise at a certain set of individuals or manners, etc., it runs contrary to our expectations that (68) cannot be used to express surprise at the *proposition* 'Robin can bake pies.' In fact, it can only have the three interpretations we've already seen in connection with *wh*- and nominal exclamatives: it can be used to exclaim that the amount of pies Robin can bake is high (the amount reading), that the degree to which the pies Robin can

bake are \mathbb{P} (delicious) is high (the gradable reading), and that the degree to which Robin can bake pies ADV (skillfully, quickly) is high (the evaluation reading). This last reading, as with the *how*-exclamatives in (12), is the result of a null gradable adverb associated with the verb.

As with other types of exclamatives, inversion exclamatives are subject to the Evaluativity Restriction. Imagine a scenario in which you expect Mark's son to be quite short, because both Mark and his wife are short. When you meet him, you realize that he is 5'9", which is an average height for a boy his age. In such a scenario, an utterance of (69) is expressively incorrect. This is because, despite the fact that Mark's son was taller than you expected, he is not tall with respect to the relevant standard of tallness.

(69) #(Boy,) Is Mark's son tall!

The fact that inversion exclamatives are subject to both these restrictions suggests that they too are uttered with Degree E-FORCE. This in turn means that the content of an inversion exclamative is a degree property. Whereas with *wh*-exclamatives and nominal exclamatives, this conclusion was more or less compatible with standard ideas of the syntactic construction used to express the exclamative, it is hard to imagine a syntactic construction which has the syntax of an inversion exclamative but which denotes a degree property.

As before, there are two obvious options: the first is that inversion exclamatives are expressed with yes/no questions. However, in anyone's theory, yes/no questions denote either a set of propositions (Hamblin (1973)/Karttunen (1977)), a singleton set of propositions (Abels, 2004a,b) or a proposition (Groenendijk and Stokhof, 1989). All of these options are incompatible with the above formulation of Degree E-FORCE. The other option is that inversion exclamatives are expressed with sentences (but ones, for whatever reason, which display subject-auxiliary in-

version). Of course, this would presumably mean that the content of an inversion exclamative is a proposition, which is also an unacceptable result.

The situation we're left with is one that recalls the Milner/Gérard Generalization about exclamatives: what distinguishes exclamatives from other expressions is their ability to have an extreme-degree interpretation in the absence of overt degree morphology. The question posed by inversion exclamatives is: how is this possible?

The morphosyntax of inversion exclamatives

There are several reasons to doubt the claim that inversion exclamatives are expressed with yes/no questions. First, both constituent and yes/no questions demonstrate subject-auxiliary inversion in interrogatives:

- (70) a. How many pizzas can Lucy eat? *vs.* Lucy can eat 3 pizzas.
b. Can Lucy eat 3 pizzas? *vs.* Lucy can eat 3 pizzas.

But *wh*-exclamatives and inversion exclamatives differ in whether or not they display inversion.

- (71) a. (Wow,) How very many pizzas Lucy can eat! (*no inversion*)
b. (Boy,) Can Lucy eat a lot of pizzas! (*inversion*)

This indicates, curiously, that the inversion preserved in inversion exclamatives is independent of both the illocutionary force of exclaiming and the syntax of questions.

Noriko McCawley, in her 1973 response to Elliott (1974), lists several additional reasons to not assimilate the form of inversion exclamatives with yes/no questions. I'll list some particularly striking reasons here (the examples are for the most part hers).

First, while intensifiers like *very* are permitted and in some cases required in *wh*-exclamatives, and while they're permitted in yes/no questions, they are unac-

ceptable in inversion exclamatives.

- (72) a. (Wow,) How very/incredibly/extremely easy syntax is!
b. Is syntax very/incredibly/extremely easy?
c. *(Boy,) Is syntax very/incredibly/extremely easy!

Second, inversion exclamatives seem to be incompatible with overt negation and NPIs, again in contrast to yes/no questions in interrogatives.

- (73) a. Isn't syntax easy?
b. *(Boy,) Isn't syntax easy!
- (74) a. Are you ever hungry? NPI *ever*
b. (Boy,) are you ever hungry! intensifier *ever*

While the *ever* in (74a) is the NPI *ever*, meaning roughly 'at any time,' the *ever* in (74b) functions more like an intensifier. McCawley provides additional evidence for this distinction.

Third, inversion exclamatives differ from yes/no questions in interrogatives in that they do not permit degree quantifiers like the equative and the superlative.

- (75) a. Is syntax as easy as phonology?
b. *(Boy,) Is syntax as easy as phonology!
- (76) a. Is she the prettiest girl in your class?
b. *(Boy,) Is she the prettiest girl in your class!

Finally, inversion exclamatives, like both *wh*- and nominal exclamatives, are intolerant of indefinites, regardless of where they occur in the expression.

- (77) a. Does Monica/someone/anyone love Jerry?
b. (Boy,) Does Monica/*someone/*anyone love Jerry!
- (78) a. Are \emptyset /some/any graduate students industrious?
b. (Boy,) Are \emptyset /#some/*any graduate students industrious!¹⁸

¹⁸The '#' signifies that the exclamative is grammatical with *some* but not under the indefinite interpretation; the speaker must have in mind particular graduate students he considers industrious.

Inversion exclamatives and a null degree operator

The last two subsections explained two challenges for an account of inversion exclamatives: first, they denote degree properties despite appearing not to; and second, they demonstrate morphosyntactic and semantic properties that are not characteristic of either yes/no questions or other types of exclamatives. Here, I propose that both of these challenges can be overcome with the same mechanism: a null degree operator.

The semantic importance of this operator is to lend a degree reading to a construction which would otherwise not have one. The interpretations of inversion exclamatives indicate that they denote a degree property which functions as the argument for DEGREE E-FORCE. The null element, which I'll call 'DegOp,' would be base-generated in the degree argument position of a gradable adjective (or gradable adverb, or quantity operator). It would then raise – leaving a trace of type *d* – to a higher point in the derivation, where this degree variable would be lambda-abstracted over, resulting in a degree property.

Postulating a null degree operator base-generated in the spec,DegP of exclamatives in spec,DegP could account for the unacceptability of degree quantifiers in inversion exclamatives.¹⁹

- (80) a. (Boy,) Is syntax (*so) easy!
b. *(Boy,) Is she the prettiest girl in your class!

The tree in (81) below demonstrates what the structure for the (gradable reading of the) exclamative *Boy, does Robin bake pies!* would look like under this analysis. DegOp moves to spec,CP, leaving a trace of type $\langle d \rangle$. When DegOp is interpreted

¹⁹Although note that comparative sentences in exclamations are relatively acceptable:

- (79) (Boy,) Is she taller than you!

In this respect, the DegOp seems capable of occurring wherever these degree quantifiers can be overtly modified: $\checkmark A$ is much taller than B ; $*A$ is much as tall as B .

Second, as it stands, this degree operator is very powerful. Unlike e.g. the quantity operator QUANTITY, the distribution of DegOp seems to be restricted to inversion exclamatives. In non-exclamation speech acts, we don't seem to be able to use an inversion declarative to denote a degree property:²⁰

- (82) a. *Adam is as tall as [_{CP} is Doug tall].
b. *John cooks better than [_{CP} does Robin bake desserts].

This relatively restricted distribution of DegOp could ostensibly be the result of a selectional relationship between Degree E-FORCE and DegOp. But it is in the very least unclear how to establish a selectional relationship (syntactic or semantic) between an illocutionary force operator and some element in the form used to express a speech act.

An additional complication comes from the relatively restricted syntax of DegOp within the constructions in which it is licensed. Unlike e.g. *wh*-operators, DegOp doesn't appear to be able to move out of the clause in which it is base-generated.²¹

- (83) a. (Boy,) Did the doctors say she was tall!
b. (Boy,) Does Mary think she's beautiful!

Specifically, we would predict from DegOp's operator status that (83a) could have a reading on which the speaker is expressing surprise at how tall the doctors said she was (if DegOp was base-generated with the gradable adjective) as well as a reading on which the speaker is expressing surprise at how effusively or emphatically the doctors said she was tall (if DegOp was base-generated in the higher clause with a null adverb associated with the verb *say*). However, only the latter reading is possible, which suggests that inversion exclamatives can only be formed from DegOps which have not crossed a clause boundary.

An alternative possibility is that DegOp instead has the syntax of an adverb, as

²⁰Although see Kennedy and Merchant (2000) for a discussion of comparatives with 'missing CPs' like *That pizza was better than was expected*.

²¹Thanks to Mark Baker for discussion here.

adverbs too have been known to trigger inversion (see e.g. Progovac, 1993):

- (84) a. Only last night did I eat pizza for the first time.
b. *Only last night I ate pizza for the first time.

The meaning of DegOp makes it incompatible with an analysis in which it is merged as an adjunct (as in for instance *than*-clauses in Bhatt and Pancheva, 2004). (It must be introduced into the derivation relatively low so that it can be associated with a particular degree argument, and this degree must then be λ -abstracted over at the top of the derivation.) However in Izvorski (1995), Roumyana Pancheva, adopts a proposal in Grimshaw (1987) (which is attributed to Roger Higgins) that subcomparative clauses contain a covert degree adverbial which is base-generated low and undergoes (restricted) *wh*-movement. Although I do not have a complete idea now of the parallels between Pancheva's account and the DegOp one below, the empirical potential of the DegOp account warrants a more careful study of the syntax of these degree operators.

In sum, the semantics of inversion exclamatives suggests that they denote degree properties, and the syntax of inversion exclamatives suggests that these degree properties are formed by the movement of a null degree operator. However, such an account of inversion exclamatives encounters two complications: first, it is not clear how to formulate the distribution of DegOp so that it is restricted to inversion exclamatives. And second, given that the movement of DegOp seems to be clause-bound, its syntactic status as an operator seems questionable. I hope that further research of inversion exclamatives will lead to a more satisfying account of how they come to mean what they mean.

As a side note: McCready (2006, 2007) discusses the meaning of expressions headed by the English *man*, as in (85):

- (85) a. Man John ate some spicy salsa.
b. Man that movie was boring.

There are a few different ways of pronouncing sentences headed by *man*: with or without a pause after *man*, and with a rising intonation on *man* or a rise-fall intonation on *man*. McCready argues convincingly that expressions uttered without a pause and with a rising intonation express surprise on the part of the speaker towards a degree reading of the proposition headed by *man*, very much like exclamatives. E.g. (85b) expresses that the movie was boring to a high degree.

The (other) parallels are strong: the indefinite *some* in (85a) can only have a specific indefinite reading (just as in *Boy are some graduate students industrious!*). In McCready's analysis, S_D parallels DegOp in some ways. Although there are obvious differences between the types of expressions (*man* sentences, for one, seem to be assertions), the fact that these properties (and the corresponding need for DegOp, or something like it) are attested elsewhere in language indicates that they are more systematic than a study restricted to exclamatives might suggest.

This final section examines claims that exclamatives can be embedded, as well as claims that the content of exclamatives is presupposed.

4.6 More on the nature of exclamatives

4.6.1 'Embedded' exclamatives

There is another interesting way in which the semantics of exclamatives and EVAL connects. This section discusses what others have referred to as "embedded exclamatives" and argues that they are only an instance of evaluative ([+E]) embedded *wh*-clauses.

It should be clear from the discussion above that the characterization of exclamations presented here is incompatible with them being embedded (and incompatible with the notion that there is a syntactic category 'exclamative'). Specifically, I have identified exclamations as speech acts which express surprise on the part of

the speaker. These clauses, when embedded, no longer constitute their own speech act, and have the potential to describe surprise only as a function of the verb under which they are embedded (e.g. *I am surprised at how tall you are*, which has assertoric force). There is, as I argued above, something intuitive about attributing the difference between the exclamative *How short Melisa is!* and the declarative *Melisa is very short* to a difference in illocutionary force. However, in capturing this intuition, we lose the ability to talk about exclamatory force in embedded clauses.

However, clauses like *how high the basement ceiling is* seem to mean something different when embedded by e.g. *wonder* on the one hand and *be surprised* on the other. In the past, it has been argued that this is a result of embedding verbs selecting for interrogatives or exclamatives (Elliott, 1974; Grimshaw, 1977, 1979). I'll first present the empirical motivations for making this argument and then provide an alternative explanation of the data.

Until now, my use of the terms 'exclamative' and 'interrogative' has been restricted to matrix forms. Because Grimshaw's view is that questions can have interrogative-like meanings or exclamative-like meanings even when they are embedded, she uses the terms 'exclamative' and 'interrogative' for matrix and embedded *wh*-clauses alike. To avoid confusion, I will use the terms 'exclamative*' and 'interrogative*' to discuss Grimshaw's theory: the former refers to an embedded clause with the meaning Grimshaw associates with matrix exclamatives, and the latter refers to an embedded clause with the meaning she associates with matrix interrogatives.

Different types of embedded clauses?

The idea is this: a (*wh*-)clause, when embedded, can take on an interrogative meaning (can be an interrogative*) or an exclamative meaning (can be an exclamative*). The idea is especially compelling because these meanings can be reliably associ-

ated with different embedding verbs: ones like *wonder* seem to be able to only embed interrogatives*, and ones like *be surprised* seem to be able to only embed exclamatives*.

- (86) a. Gary wondered how high the basement ceiling is.
b. Gary was surprised at how high the basement ceiling is.

Grimshaw (1979) (p. 299) observes that the embedded clause in (86a) is neutral with respect to the actual height of the ceiling; it does not imply that the ceiling has any particular height. She considers this to be the interrogative* interpretation of the *wh*-clause. In contrast, (86b) is true if Gary discovers the ceiling be significantly high, and doesn't require that he knows the particular height of the ceiling. This is the exclamative* reading.

Grimshaw concludes that *wonder* is an interrogative*-only embedder, and *surprise* is an exclamative*-only embedder. There are, however, verbs which can embed either, which leads to a systematic ambiguity.

- (87) Gary knows how high the basement ceiling is.

In one reading of (87), the ceiling has a height *d* and Gary knows that the ceiling is *d*-tall. This is the interrogative* reading: if Gary knows that the ceiling is 3 meters high, (87) under this interpretation could be true even if Gary has no expectations about ceiling height (and therefore has no idea of the significance of the ceiling's height). In the other reading of (87), the embedded exclamative* reading, the ceiling has a height *d*, and *d* surpasses some standard of highness, and Gary knows that the ceiling surpasses that standard of highness.

Grimshaw associates the fact e.g. *wonder* can only embed interrogatives* with its inability to embed *wh*-clauses with exclamative-specific morphology (like intensifiers and *what a*).

- (88) a. Gary was surprised at how very high the basement ceiling is.
 b. *Gary wondered how very high the basement ceiling is.
- (89) a. Ethel was surprised at what a dork Charles is.
 b. *Ethel wondered what a dork Charles is.

The success of this argument relies on the assumption that this morphology is connected to the exclamatory force of the *wh*-clause (not, as I suggested above, the evaluativity of the *wh*-clause).

Lahiri (2000) and Huddleston (1993) criticize Grimshaw's claim that verbs like *surprise* can only embed exclamatives* based on the observation that they can in fact embed clauses that do not form acceptable matrix exclamatives.

- (90) a. Amy is surprised at who Bruno married.
 b. Amy is surprised at why Bruno married her.
 c. Amy is surprised at who Bruno married and why.

The problem of embedded exclamatives*, then, is this: if a verb like *surprise* has roughly the same meaning as the illocutionary forceoperator of exclamation (and can thereby embed exclamatives*), why can it embed clauses which cannot be used to express acceptable matrix exclamatives? And if, on the other hand, *surprise* does not embed exclamatives*, how does one account for the presence of 'exclamative-specific' morphology in embedded clauses like (88) and (89)?

Embedded Questions and EVAL

As I indicated above, embedded questions can be three-ways ambiguous, instead of 2-ways ambiguous.²² I formalize these interpretations here:

- (91) Gary knows how high the ceiling is.
 a. **Precise Reading:**
 The ceiling's height is d and Gary knows its height is d .
 b. **Exceed Reading:** The ceiling's height is d , $d > s_{high}$, and Gary knows its height $> s_{high}$.

²²Cf. Sæbø (2007), who argues that embedded questions are more than 3-ways ambiguous.

- c. **Precise/Exceed Reading:** The ceiling's height is d , $d > s_{high}$, and Gary knows its height is d and $> s_{high}$.

The 'precise' reading in (91a) corresponds to Grimshaw's interrogative* reading. I suspect that it is (91b), the 'exceed' reading, which corresponds to Grimshaw's exclamative* reading, but it might be the 'precise/exceed' reading in (91c) instead.

When the interpretations of an embedded clause are displayed as in (91) – with explicit comparison (or lack of) to a standard of lowness – it is easy to see their kinship to the evaluativity data in Chapter 3. Specifically, the clause *how high the basement ceiling is* may or may not contain an EVAL (and we would expect this ambiguity given the analysis in Chapter 3). Therefore, (91a), the **precise** reading, is just an embedded clause which does not contain an EVAL. In (91b) an (91c), the **exceed** and **exceed/precise** readings, the embedded clause contains EVAL, and the two readings differ from each other with respect to the argument of *know* (whether or not it is a singleton set of propositions).

Following Heim's (1994, 133) version of the definition in Karttunen (1977), I characterize *know* as a function from sets of propositions to sets of individuals (denoted by the subject) type $\langle\langle s, t \rangle, t \rangle, \langle e, t \rangle$.

$$(92) \quad \llbracket know \rrbracket(w)(q)(x) = 1 \text{ iff } x \text{ believes } \lambda w' [q(w') = q(w)] \text{ in } w \\ x \text{ an individual, } q \text{ a question } \in D_{\langle\langle s, t \rangle, t \rangle} \text{ and } w \text{ the world of evaluation}$$

For an analysis of the interpretations of embedded clauses, we'll need to characterize the content of *wh*-clauses (and definite descriptions) as a set of propositions rather than a property, as we have been. The operator below is a type-shifter from an n -place relation denotation to a set-of-propositions denotation.

$$(93) \quad \lambda \mathcal{Q}_{\langle s, \langle \tau_1, \dots, \tau_n, t \rangle \rangle} \lambda w' \lambda p \exists x_1, \dots, x_n [p(w') \wedge p = \lambda w. \mathcal{Q}(w)(x_1, \dots, x_n)]$$

This set of propositions denoted by a complement may or may not be evaluative. When the clause *how high the ceiling is* is embedded by *know*, we get the two

meanings in (94).

- (94) Gary knows how high the ceiling is.
- a. $\lambda w.\text{believes}(w)(\text{gary},$
 $\lambda w'[\lambda p\exists d[p(w') \wedge p = \lambda w''.\text{high}(w'')(\text{ceiling},d)]$
 $= \lambda p\exists d[p(w) \wedge p = \lambda w''.\text{high}(w'')(\text{ceiling},d)]])$
- b. $\lambda w.\text{believes}(w)(\text{gary},$
 $\lambda w'[\lambda p\exists d[p(w') \wedge p = \lambda w''.\text{high}(w'')(\text{ceiling},d) \wedge d > s_{\text{high}}]$
 $= \lambda p\exists d[p(w) \wedge p = \lambda w''.\text{high}(w'')(\text{ceiling},d) \wedge d > s_{\text{high}}]])$

These readings correspond to the **precise** and **precise/exceed** readings respectively.²³

The other reading – the **exceed** reading – is one in which the argument of *know* is more like an evaluative relative clause than an evaluative question. The reading as it is described in (91b) corresponds to the truth conditions in (95), in which the degree d is existentially bound inside of the proposition, and the set of propositions is therefore a singleton set.

- (95) $\lambda w.\text{believes}(w)(\text{gary},$
 $\lambda w'[\lambda p.p(w') \wedge p = \lambda w''\exists d[\text{high}(w'')(\text{ceiling},d) \wedge d > s_{\text{high}}]$
 $= \lambda p.p(w) \wedge p = \lambda w''\exists d[\text{high}(w'')(\text{ceiling},d) \wedge d > s_{\text{high}}]])$

A semantic system that derives this meaning from a degree-property denotation of a question requires a type-shifting operator which is distinct from the one in (93). If (93) is a type-shifter from n -place relations to a set of propositions, (96) is a type-shifter from n -place relations to a singleton set of propositions.

²³Roger Schwarzschild (p.c.) points out that, once we consider issues of vagueness inherent to the semantics of degree, the distinction between the two readings in (94a) and (94b) is not so clear. Specifically, it is easy for us to think of Gary's knowledge of the ceiling's height as corresponding to his knowledge that the ceiling is d -tall for a precise d (say, 10ft) because it is natural to associate ceiling height with a precisely delineated scale. But there are two different ways to complicate this simplicity: first, modify the scenario so that Gary is a dog, and therefore has no capacity for abstract measurement. If the ceiling in question is the one in his doghouse, it seems reasonable to think that Gary knows how high the ceiling is if he knows just how tall he can stand before he hits his head on it. A second way to complicate matters is by considering a scale which has no canonical measure: beauty, for instance. For A to know that B is beautiful to a degree d does not necessarily mean that there is a specific and identifiable degree on the 'beauty' scale d such that A has a belief about d .

Schwarzschild's point is that when we change the situation so that the degrees are a little more fuzzy, it may no longer be clear who in a given scenario knows a degree of highness or beauty in the 'precise' sense or the 'exceed' sense. This certainly seems correct, and a consequence might be that the term 'precise' is misleading. However, given that there seems to be a true ambiguity in sentences like *John knows how tall the building is*, I maintain that the distinction is useful.

$$(96) \quad \lambda \mathcal{Q}_{\langle s, \langle \tau_1, \dots, \tau_n, t \rangle \rangle} \lambda w' \lambda p. p(w') \wedge p = \lambda w \exists x_1, \dots, x_n [\mathcal{Q}(w)(x_1, \dots, x_n)]$$

The EVAL analysis can therefore capture Grimshaw's observations. The presence of an intensifier in a question (e.g. *very*) signifies the presence of an EVAL in that construction. (I suggested above that this is because *very* modifies contextual standards, which are introduced by EVAL.) Some embedding verbs tolerate their question complements to be unambiguously evaluative in this way, some embedding verbs do not. The next section briefly discusses the semantics of these verbs.

The semantics of embedding verbs

A complete semantic account of embedding verbs like *wonder* and *surprise* would and has warranted much more extensive attention than I can afford here (Abels, 2004a,b; Guerzoni and Sharvit, 2007, among others), so I will just discuss the relationships of these verbs to evaluativity.

I have already addressed the relative incompatibility of intensifiers like *very* and the act of questioning (Abels 2004a, citing d'Avis 2002). As Abels puts it: "Intensified *wh*-questions have presuppositions that make them incompatible with questioning" (p. 23-4). Specifically, the acts of asking a question Q and wondering about Q are only felicitous if the speaker (or the subject of the embedding verb) are ignorant with respect to Q . In many cases, knowledge that Q is evaluative is sufficient to indicate that the speaker is not ignorant about Q . Given that intensifiers signify evaluativity, this translates directly into acts of inquiry about questions with intensifiers being infelicitous (97a) and assertions of wonder about questions with intensifiers being unacceptable (97b).

- (97) a. #How incredibly tall is Doug?
 b. *Sue wonders how incredibly tall Doug is.

However, in some contexts, possibly those which can be described as ones

where the evaluativity of Q is common knowledge, it is possible to ask or wonder about the extent to which Q is evaluative. This explains the difference in acceptability between the expressions in (97) and those in (98).

- (98) A: It turns out Doug is incredibly tall.
B: How incredibly tall is he?
B': Hmm, I wonder how incredibly tall he is.

In contrast, verbs like *surprise* assert that the speaker is surprised by the complement of the verb. Abels (2004a) defines *surprise* as a relation between an individual and two propositions which are defined in terms of the question's mention-some answers: one proposition expected by the speaker, and one (contradictory) proposition that is actually true. Naturally, whether or not someone is surprised that p doesn't strictly correlate with whether or not p is evaluative. In this respect, *surprise* differs from Degree E-FORCE: it requires that its subject be surprised at p , but not that p be evaluative.

- (99) a. Robin was surprised at how (very) tall her sons had grown.
b. How *(very) tall Robin's sons had grown!

Of course, given the nature of surprise, it is completely compatible with the semantics of *surprise* that its argument p be evaluative.

The same goes for e.g. *know*, which Grimshaw analyzes as being able to embed both interrogatives* and exclamatives*, and which also allows but does not require its arguments to contain intensifiers. As the ambiguity described in (91) demonstrates, knowing that p is compatible both with p being non-evaluative (or ambiguously evaluative) and with p being evaluative.

The consequence of this approach is that there are two types of embedding verbs, rather than three: verbs that are incompatible (barring special contextual cues) with unambiguously evaluative arguments (like *wonder*), and verbs that are not (like *know* and *surprise*). *Surprise* patterns with *know* in this respect because

it differs from the illocutionary force operator used to utter exclamatives in not **requiring** that its argument be evaluative.

Importantly, it's not clear how to extend this discussion and analysis to embedded clauses headed by *what a*. It is consistent with the data and the account above that *what a* patterns with *very* and other intensifiers in signifying evaluativity. However, I have no account of why or how this is so. Establishing a connection between these two different kinds of 'exclamative-specific' morphology (in this analysis, 'evaluativity-specific' is a better term) is an important aspect of a complete account of exclamatives (and evaluativity).

4.6.2 Exclamatives and presupposition

According to Degree E-FORCE, one can infer from an expressively correct utterance of an exclamation that (a) the speaker **believes** that a high degree satisfies the denoted degree property; and (b) the speaker **did not expect** that high degree to satisfy the property. And this seems like the right way to characterize what's going on in an exclamation.

There are many theories of exclamatives which analyze the semantic content of exclamatives as presupposed. Zanuttini and Portner (2003), in particular, place a lot of weight on the claim that exclamatives can only be embedded under factive verbs. They infer that exclamatives contain a factivity operator in their CP, which contributes to their odd syntax (relative to questions, see (55b) and (56)) but also contrives the discourse contribution of exclamatives. Both Abels (2004b) and Castroviejo-Miró (2006) present arguments that the class of exclamation-embedding predicates are not best characterized as factive. In Section 4.6, I take a different approach, arguing that exclamatives are by definition not embeddable, and so it is wrong to infer from the behavior of the *wh*-complements of e.g. *surprise* to the properties of exclamatives.

In this section I'll briefly review some arguments in the literature for the claim that the content of exclamatives is presupposed, and then give reasons to distrust them. I omit those which involve embedded *wh*-questions because, as discussed above, I see no reason to equate embedded *wh*-clauses with exclamatives. This eliminates several important tests for semantic contribution: we are unable to see how the content of an exclamative projects, for example, or takes scope over an embedding verb or behaves under negation.

One argument for the presuppositional nature of exclamatives comes from their use in discourse. Zanuttini and Portner (2003) argue that it is significant that exclamatives cannot form felicitous answers to interrogatives (the acceptability of answers like 'A lot' in (100) indicate that this has nothing to do with the potential vagueness of an exclamative-answer).

- (100) Q: How many shoes does Amy have?
A: A lot!
A': #How very many shoes Amy has!

The conclusion they come to is that A' is unacceptable because its content is presupposed, rather than asserted, and questions require assertions as answers. However, presupposition need not factor into an explanation of (100): if questions require assertions as answers, then the unacceptability of A' is a natural consequence of the fact that exclamations are different speech acts from assertions (Castroviejo-Miró, 2006, makes this same point).

Important evidence against the claim that the content of an exclamative is presupposed is the fact that this content seems to be deniable. (101) gives a clear case of a non-exclamative presupposition which demonstrates that presuppositions cannot be directly denied. However, the content of an exclamative can be denied (102), indicating that its content is not presupposed.

- (101) A: Mico's wife does macrame.
 B: #Not really; he's not married.
- (102) A: How very tall Elwood is!
 B: Not really; he's just wearing platform shoes.

This conclusion is also consistent with von Fintel (2004)'s 'Hey, wait a minute!' test, which probes presuppositions (this point is also made in Mayol, 2008).

- (103) A: Mico's wife does macrame.
 B: Hey, wait a minute, Mico isn't married!
 B': #Hey, wait a minute, she doesn't do macrame!
- (104) A: What incredibly large feet you have!
 B: #Hey, wait a minute, they're not that big!

So we can conclude that the content of exclamatives is not presupposed. But it's clearly not asserted; assertion, as discussed above, is a type of speech act distinct from exclamation. The illocutionary force of assertion entails that the speaker *believes* (or, more weakly, *wishes to communicate*) a proposition *p*. The illocutionary force operators of exclamation – both PROPOSITION E-FORCE and DEGREE E-FORCE – entails that the speaker *is surprised at p* (or, more weakly, *finds p surprising*).²⁴

One difference I've found between the entailment encoded in an assertion and an entailment encoded in an exclamative is that the former can be strongly denied or weakly denied, while the latter can only be weakly denied. Specifically, both assertions and exclamatives can be followed in discourse by a denial with the phrase *not really*; this was given in (102) as evidence against the content of an exclamative being presupposed. I repeat it below (along with an instance of an assertion).

²⁴The entailment associated with exclamation may be similar to Potts' (2003, 2005) characterization of conventional implicature. However, his discussion of conventional implicature focuses on the contribution of words like the attribute adjective *damn* – rather than speech acts – and how the meanings contributed by these words project out of embedded contexts, so it's not clear to me that this similarity is sufficient to equate the two phenomena. In Mayol (2008), the author does just this (analyze the semantic contribution of exclamatives as a conventional implicature), but the bulk of her arguments come from perceived properties of 'embedded exclamatives,' so for reasons discussed above I do not find them compelling.

- (105) A: Elwood is very tall.
 B: Not really, he's just wearing platform shoes.
- (106) A: How very tall Elwood is!
 B: Not really, he's just wearing platform shoes.

However, only assertions can be 'strongly denied,' with the word *no*.

- (107) A: Elwood is very tall.
 B: No, he's just wearing platform shoes.
- (108) A: How very tall Elwood is!
 B: #No, he's just wearing platform shoes.

There are two conclusions to draw from the above data: first, the contribution of an exclamative – that the speaker is surprised at *p* – cannot be directly denied. (In (106), B could not felicitously respond “Not really, I told you about it the other day” to deny A's surprise at Elwood's height. Second, the phrase *not really* – but not the word *no* – seems to be able to deny the object of the speaker's surprise, the proposition *p*.²⁵

It's not clear to me how *not really* can access the object of an expressive in discourse, nor what prevents *no* from doing so. But it is clear that the content of an exclamative is not presupposed, and it is, by virtue of being exclaimed, not asserted. The utterance of an exclamation entails that its speaker is surprised that *p*. We might additionally infer from the ability of exclamatives to be (weakly) denied that, in some discourses, the utterance of an exclamative can also entail that the proposition *p* formed from the content of an exclamative is true.

4.7 Conclusion

This study of exclamatives began with an interest in the distribution of evaluativity. It has been useful in this respect: embedded *wh*-clauses (and nominals), as

²⁵Adding to the mystery is the ability of proposition exclamations to be strongly denied (e.g. A: 'Elwood is very tall!' B: 'No, he's just wearing platform shoes.').

predicted in Chapter 3, may or may not contain EVAL, with significant semantic repercussions. I've argued here that the difference between verbs like *wonder* and *surprise* is that the former does not allow evaluative complements, while the latter does. These specifications are reflected in the corresponding distribution of intensifiers in these embedded clauses.

Unlike e.g. *surprise*, the illocutionary force operator used to utter exclamatives encodes speaker surprise in the speech act, rather than semantically. It also requires that its content be a degree property (the 'Degree Restriction') and that it involve comparison to a standard (the 'Evaluativity Restriction').

This last aspect of exclamatives has absorbed most of my attention here, and it has led to a second way in which exclamatives can contribute to our knowledge about the meaning and distribution of degree modifiers. *Wh-*, nominal and inversion exclamatives all pattern alike in that their content is restricted to degrees. I've reasoned that this must be due to the fact that they are expressed with forms which denote degree properties. This wasn't terribly surprising in the context of *wh-* and nominal exclamatives, but it required a novel way of conceptualizing the syntax and semantics of inversion exclamatives.

Specifically, there are semantic and syntactic reasons to think that inversion exclamatives are expressed with declarative sentences which display subject-auxiliary inversion, that these forms denote degree properties, and furthermore that movement of a null degree operator (DegOp) in these forms is what's responsible for its unusual morphosyntax and semantics. This DegOp functions as a degree modifier, but its existence makes the curious prediction that any instance of a declarative sentence with inversion has the potential to denote a degree property. I have no explanation for why this is not the case, but I hope that one can be found which resembles in some way the discussion here regarding the distribution of EVAL.

CHAPTER 5

Conclusion

The aim of the preceding three chapters has been to make more explicit the role of degree modifiers in natural language. The immediate consequence of such a project has been a better understanding of the meaning and distribution of *m*-words and evaluativity, as well as the connection between exclamation and degree semantics.

A degree modifier demonstrates two important properties (and it has these properties in common with individual modifiers). First, its distribution is defined semantically rather than syntactically: its argument is a set of degrees, and so it can theoretically occur in a variety of different syntactic environments. Second, because it doesn't change the type of the expression it occurs in, it is optional: assuming there is a set of degrees available as its argument, its presence/absence is not required/forbidden for type reasons.

Chapter 2 provided the first demonstration of a degree modifier, *m*-words.

$$(1) \quad \llbracket m\text{-word} \rrbracket = \lambda D \lambda d'. \ell(D) = d'$$

In (1), an *m*-word like *many* is a function from a set of degrees d to a singleton set of degrees d' which is its measure. This way of thinking about *m*-words is based

on others' observations of *much* as a differential modifier of comparatives, as in *A is much taller than B* (Wheeler, 1972; McConnell-Ginet, 1973; Klein, 1982).

While accounts like the DDA – which characterizes *m*-words as determiners – predict that *m*-words can occur only with nouns, this approach predicts that *m*-words can modify anything that can denote a set of degrees.

- (2)
- | | | |
|----|---|-----------------------------|
| a. | Many Midwesterners like cheese. | <i>m</i> -word + NP |
| b. | George doesn't drive much over the speed limit. | <i>m</i> -word + PP |
| c. | Adam is much taller than Doug. | <i>m</i> -word + <i>-er</i> |

Its optionality is evident in simple cases – as in *Lucy ate (many) pizzas* – but is especially important for an analysis of quantity questions in Romanian, as in (3).

- (3)
- | | | | |
|----|--------------------------------|-----------|-----------------|
| a. | Cît-e | femei | cunoaște? |
| | QUANTUM-Fpl | women | know-3sg |
| | 'How many women does he know?' | | |
| b. | Cît | de mult-e | femei cunoaște? |
| | QUANTUM of <i>m</i> -word-Fpl | women | know-3sg |
| | 'How many women does he know?' | | |

The presence of an *m*-word in a Romanian quantity question is optional but significant. Multimorphemic quantum phrases are incompatible with questions formed from upward-scalar predicates, while monomorphemic quantum phrases have the distribution normally associated with quantum phrases (e.g. *how many* in English).

This semantic difference between the two forms is accounted for if we assume that an *m*-word measures the size of a set of degrees (its argument). In the case of questions with downward-scalar predicates, the *m*-word functions as a maximality operator: its value is the size of its argument, which (in downward-scalar environments) corresponds to the largest element in its argument. In the case of questions with upward-scalar predicates, the *m*-word takes as its argument a set with no upper bound. The size of these sets is always the same – ∞ – and so these questions cease to be information-seeking, and are therefore unacceptable.

Crucially, I assume that the definition of *m*-words in (1) is the same for *many*,

much, little and *few*. Members of the pairs *many/much* and *few/little* differ in whether their argument D is a dense or non-dense set of degrees (the product of the quantity operator QUANTITY). Members of the pair *many/few* and *much/little* differ with respect to the direction of the scales with which they're associated (just like the antonyms *tall/short* in Chapter 3).

A consequence of this analysis is that the English quantum phrase *how many* need not be – and, in fact cannot be – analyzed as involving an m -word which contributes semantically to the denotation of the expression. I assimilate the (obligatory) presence of m -words in English to other instances of ‘ m -support’ in the language (Corver, 1997), as in *Lucy ate too many pizzas* or *Adam is tall but Doug is too much so*.

This study of the distribution and meaning of m -words provided a model for the study of the distribution of evaluativity, which I have analyzed in Chapter 3 as being encoded in a null degree modifier ‘EVAL’.

$$(4) \quad \llbracket \text{EVAL}_i \rrbracket = \lambda D \lambda d. D(d) \wedge d > s_i$$

Because it is a degree modifier, it can in principle optionally occur in a degree construction. This is supported by the clear difference in evaluativity between *Adam is as tall as Doug* and *Adam is as short as Doug*.

I present an account of this difference that relies on the optionality of evaluativity, along with a notion of markedness and semantic competition. First, I assume that an expression with a negative-polar antonym is marked relative to its corresponding expression with a positive-polar antonym. Second, I assume that if two different sentences S and S' share a reading p , and S' is marked relative to S , then the ability of S' to denote p is blocked by the ability of S to denote p . This notion of semantic competition was later localized to be about properties P rather than

propositions *p*.

Sentences can be formed with non-directional quantifiers, in which case the non-evaluative readings of two expressions which differ only in polarity are synonymous, and the marked (negative-polar) expression is unambiguously evaluative. Sentences can be formed with directional quantifiers, in which case the non-evaluative readings of two expressions which differ only in polarity are not synonymous, and either sentence is ambiguous between an evaluative and a non-evaluative reading. The positive construction is one *prima facie* exception to the proposal that evaluativity is optional in degree constructions. I argued that the reason positive constructions are unambiguously evaluative is because their non-evaluative interpretations assert what they presuppose.

This account of evaluativity is incompatible with the characterization of the bare equative as meaning ‘at least as — as’ (which would make it a directional quantifier). I have given some additional arguments against such a characterization, and have discussed the two remaining options: that the bare equative means ‘exactly as — as’ or has a ‘neutral’ meaning which is weaker than either. I ultimately endorse the ‘exactly’ meaning for the bare equative because provides an easy explanation for why evaluativity is presupposed rather than asserted in equatives. However, it remains a mystery given this semantics how bare equative expressions can receive an ‘at least’ or ‘at most’ interpretation in some contexts.

I have extended the EVAL proposal to account for the distribution of evaluativity in several other types of constructions: analytic vs. synthetic comparatives; phrasal vs. clausal comparatives; quantity questions with monomorphemic vs. multimorphemic quantum phrases; *more* vs. *less* comparatives; and indirect comparatives (which I argue have degree arguments with an EVAL *and* an *m*-word). Investigating some of these constructions lead to a more localized notion of semantic competition, which controlled for variation between competing structures.

Encoding evaluativity in a degree modifier predicts that it is optional in a construction, but it also predicts that it can take any set of degrees as its argument. This second property was demonstrated for *m*-words by showing that it can modify PPs and comparatives in addition to NPs. There are reasons to think that EVAL, too, can modify verbs in addition to adjectives.

Whether or not a verb has telic or atelic aspect corresponds roughly to whether the event it denotes has an inherent end point or does not have an inherent end point (respectively) (Vendler, 1957; Dowty, 1979). Some expressions with the deadjectival verb *lengthen* are telic, while some are atelic (examples from Hay et al. 1999; for recent accounts, see Kearns 2007 and Kennedy and Levin 2008).

- (5) a. The traffic is lengthening my commute. *atelic*
 → The traffic lengthened my commute.
 b. The tailor is lengthening my pants. *telic*
 ↔ The tailor lengthened my pants.

We think of the lengthening of pants as having a bound, so context allows us to fill in a contextually-set upper bound for the lengthening event in (5b), which results in the predicate being telic. However, there isn't a similar intuitive bound for the lengthening of a commute, which informs our interpretation of the atelic predicate in (5a).

Given this way of construing telicity makes clear how the difference in telicity between the 'lengthen' constructions in (5) could be accounted for with EVAL. Assuming (with Hay et al., 1999) that deadjectival verbs have degree arguments in addition to event arguments, we can imagine that a construction with the verb *lengthen* is ambiguous between a telic (having an upper bound, [+E]) and an atelic (having no upper bound, [-E]) reading. In a case in which the object of the verb, adverbial phrase or world knowledge makes one reading unavailable, that expression is in fact unambiguously [-E] or [+E] (atelic or telic). Otherwise, it is ambiguous (like *The soup cooled*). This is just one possible way in which the distribution of

EVAL can be extended to syntactic categories other than adjectives.

Chapter 4 informs the topic of degree modification in two different ways: first, it is the study of a type of utterance which is always evaluative. We learn that this is the result of a requirement of the illocutionary force operator used to utter exclamatives ('Degree E-FORCE'). Second, it shows that degree constructions – or expressions which can denote degree properties – are not only those with overt degree morphology. This suggests that the distribution of degree constructions is more broad than previously thought.

The most important point of Chapter 4 is that there is a subclass of exclamation – those expressed with *wh*-clauses, nominals and inversion constructions – which can only be used to express surprise that a certain degree has a certain property (I refer to these as 'exclamatives'). These are in contrast to another subclass of exclamation, proposition exclamations, which are not so restricted.

I argue that there is nothing inherent to the syntactic forms used to express exclamatives that account for this restriction to degrees; it must therefore be imposed by the illocutionary force operator used to utter the exclamatives. The result is two different illocutionary force operators – each resulting in an exclamation – which differ in their domain.

The benefit of this analysis is that it characterizes exclamatives in terms of their content (a degree property) rather than their form (as others have done). In response to the question: "What type of syntactic construction can be used to express an exclamative?," this account provides the answer: "Any construction which can denote a degree property". This is more compatible with the fact that exclamatives are expressed with more than one type of syntactic construction. However, it places great significance on what it means to *be able to denote a degree property*.

Specifically, I argued that the *wh*-exclamative in (6) denotes a degree property

because it contains a null gradable predicate \mathbb{P} , valued by context. And that the inversion exclamative in (7) denotes a degree property because it contains a null degree operator which raises to spec,CP.

- (6) (Wow,) What desserts Robin baked!
- a. [what [EVAL \mathbb{P} [desserts Robin baked]]]
 - b. $\lambda d \lambda w \exists X [\text{baked}(w)(\text{robin}, X) \wedge \text{desserts}(w)(X) \wedge \mathbb{P}(X, d) \wedge d > s_{\mathbb{P}}]$
- (7) (Boy,) Is that man tall!
- a. [EVAL DegOpⁱ [is that man [t_i tall]]]
 - b. $\lambda d \lambda w . \text{tall}(w)(\text{that-man}, d) \wedge d > s_{\text{tall}}$

These innovations are crucial for an analysis of exclamatives which aims to capture the Degree Restriction. But it's not obvious that they are needed outside of exclamatives, and raise the question of how their distribution can be so constrained. I've suggested that data like (8) indicate that the null gradable predicate \mathbb{P} has a distribution outside of exclamatives, possibly as a counterpart to quantity operators like COUNT and MEASURE from Chapter 2.

- (8) a. That's quite a turkey you have there! (read: good, large, crazy, etc.)
 b. She bought SOME pizza. (read: delicious, expensive, large, etc.)

However, DegOp does not seem similarly widespread. If it were, any construction with (or, due to \mathbb{P} , without) a degree word could denote a degree property, and it seems that this is not the case. The account of exclamatives presented in Chapter 4 therefore needs to be supplemented with a broader understanding about what can and cannot function as a degree construction.

Finally, the broader goal of a discussion of degree modifiers has ramifications for a semantic theory which aims to generalize across domains. We have seen substantial evidence that degree modifiers behave just like their individual counterparts. This suggests that, despite superficial differences, individuals and degrees are governed by the same (kinds of) linguistic rules.

Appendix: Antonyms and scale structure

	Evaluative in Comparative?	Evaluative in Equative?
<i>open-scale antonyms*</i>		
expensive - inexpensive	no - no	no - yes
fast - slow	no - no	no - yes
good - bad	no - no	no - yes
heavy - light	no - no	no - yes
high - low	no - no	no - yes
large - small	no - no	no - yes
long - short	no - no	no - yes
smart - dumb	no - no	no - yes
strong - weak	no - no	no - yes
tall - short	no - no	no - yes
thick - thin	no - no	no - yes
wide - narrow	no - no	no - yes
<i>partially-closed-scale antonyms (scales with either lower or upper bounds)</i>		
clever - dull	no - yes	no - yes
deep - shallow	no - yes	no - yes
kind - cruel	no - yes	no - yes
polite - rude	no - yes	no - yes
pretty - plain	no - yes	no - yes
clean - dirty	no - yes	no - yes
clear - unclear	no - yes	no - yes
dry - wet	no - yes	no - yes
healthy - sick	no - yes	no - yes
<i>closed-scale antonyms**</i>		
opaque - transparent	yes - yes	yes - yes
closed - open	yes - yes	yes - yes
complete - incomplete	yes - yes	yes - yes
perfect - imperfect	yes - yes	yes - yes
<i>extreme adjectives</i>		
bitter - sweet	yes - yes	yes - yes
happy - sad	yes - yes	yes - yes
hot - cold	yes - yes	yes - yes
painful - pleasurable	yes - yes	yes - yes
beautiful - ugly	yes - yes	yes - yes
brilliant - stupid	yes - yes	yes - yes
fat - skinny	yes - yes	yes - yes
terrible - great	yes - yes	yes - yes

*Unger (1975) calls these 'relative antonyms'; Cruse (1986, 2000) calls them 'polar antonyms'.

**Unger calls these 'absolute antonyms'; they are also referred to as 'complementary antonyms'.

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