Notes on the Comparison Class

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Abstract. This paper investigates the role of comparison classes in the semantics of gradable adjectives in the positive form, focusing on the case where the comparison class is expressed overtly via a *for*-phrase (e.g. *John is tall for a jockey*). Two central questions are addressed: what information does the comparison class provide, and how is this information integrated compositionally? It is shown that the standard of comparison invoked by the positive form can be analyzed as a range of values whose width is based on the degree of dispersion in the comparison class. Compositionally, the comparison class can be analyzed as an argument of a null positive morpheme (contra Kennedy [13]), in parallel to recent proposals for the superlative (e.g. Heim [9]). The implications of the analysis for the choice between degree- and delineation-based analyses of gradable adjectives are discussed.

1 Introduction

A long tradition (Bartsch & Vennemann [3], Cresswell [5], Klein [14], von Stechow [17], Fults [8], van Rooij [16]) holds that sentences involving vague predicates, such as those in (1), should be analyzed with reference to a **comparison class** that in some way serves to provide a frame of reference or standard of comparison. For example, (1a) might be interpreted as saying that Fred's height exceeds the standard for some set of individuals of which Fred is a member (adult American men, 8-year-old boys, basketball players, etc).

(1) a. Fred is tall
b. Sue's apartment is expensive
c. George doesn't have many friends

This view is made more plausible by the fact that the comparison class may apparently be made overt via a *for*-phrase, as in (2):

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(2) a. Fred is tall for an eight-year-old
b. Sue's apartment is expensive for an apartment on this street
c. For a politician, George doesn't have many friends

Results from psycholinguistic experimentation further support the reality of the comparison class in the interpretation of vague adjectives - even among children. Barner & Snedeker [2] presented 4-year-old children with a collection of doll-like objects of varying heights, which were given the novel name 'pimwits'. When asked to identify which were the tall and short pimwits, children classified roughly the tallest third of the array as 'tall' and the shortest third as 'short'. But when the distribution of heights of the objects was changed (i.e. by adding more tall or short pimwits), children's standards for *tall* and *short* changed correspondingly, indicating that the statistical properties of the comparison class provided were used in determining the extensions of these words.

The present paper takes the notion of a comparison class as a starting point, and addresses the question of how the standard of comparison is set relative to the comparison class. That is, what information does the comparison class provide, and how does this enter into the semantic representation? Here, I will focus in particular on examples featuring overt *for*-phrases, such as in (2), and argue that the same treatment can be extended to the corresponding bare cases, as in (1).

I approach these questions within a degree-based framework, according to which the truth conditions of sentences involving gradable adjectives are expressed in terms of relationships between degrees on a scale associated with some dimension of measurement (see especially Cresswell [5], as well as later work in this tradition such as Heim [10] and Kennedy [12, 13]). This approach could perhaps be considered the current standard in the analysis of gradability and vagueness, and with some good justification. It is first of all widely accepted that semantics must at least sometimes make reference to the notion of degrees, the classic case of this being examples where degrees are explicitly mentioned, such as *Fred is 1,8 meters tall* or *John is 5 cm taller than Fred*. By adopting a degree-based framework more generally, it is possible to give a unified analysis to cases such as these as well as those where degrees are not mentioned (e.g. *Fred is taller than John*). Beyond this, degree-based approaches have been shown to allow the compositional analysis of a wide range of degree modifiers, including *very*, *too*, the comparative morpheme *-er*, the equative *as*, measure phrases, and others.

But the unmodified or positive form of gradable adjectives, where there is no overt degree morphology, poses a bit of a challenge to degree theories. Developing an adequate treatment of the positive form is necessary to establish the general applicability of what has proved to be an otherwise very fruitful approach to the analysis of gradablility, and a number of authors have tackled this problem (including Cresswell [5], von Stechow [18], Fults [8], Kennedy [13], Rett [15]). The present work is intended to contribute to this line of research.

Degree-based frameworks are not, however, the only option for the semantic treatment of gradable adjectives. A leading alternative is the delineation-based

approach of Klein [14], in which the semantics of gradable expressions are stated in terms of relationships between individuals, not degrees. Though it is not my primary goal here, at the end of the paper I will briefly contrast how degree- and delineation-based theories fare with respect to the data discussed here, and consider the implications of the present analysis for the choice between these two approaches.

2 Comparison classes and standards

2.1 Standard as range

Following Cresswell [5] and others, I take gradable adjectives to express relationships between individuals and degrees (3). As a first attempt, let us then imagine that in the case of the positive (unmodified) form of the adjective, a comparison class provides a standard of comparison in the form of a standard degree $d_{Std:C}$ that saturates the first (degree) argument of the gradable adjective (4)[1]:

(3) $[\![\text{tall}]\!] = \lambda d \lambda x.HEIGHT(x) \geq d$

(4) $[\![\text{Fred is tall for an 8-year-old}]\!] = 1$ iff $HEIGHT(fred) \geq d_{Std:8.yr.olds}$

How might $d_{Std:C}$ be determined?

A straightforward possibility suggested in the early literature on the topic (e.g. Cresswell [5]) is that the standard is an average over the comparison class. But Kennedy [13] points out that matters cannot be as simple as this, in light of the felicity of examples such as (5).

(5) Nadia's height is greater than the average height of gymnasts, but she still isn't tall for a gymnast

Based on (5) it seems that $d_{Std:C}$ would need to be a degree greater than the average; but it is not at all clear what this degree should be.

Taking the standard of comparison to be an average (or any other single point) provided by the comparison class also raises questions as to the proper treatment of positive/negative antonym pairs such at *tall* and *short*. It seems that pairs such as (6a,b) are interpreted with reference to the same comparison class (either overt or covert).

(6) a. Fred is tall (for an 8-year-old)
b. Fred is short (for an 8-year-old)

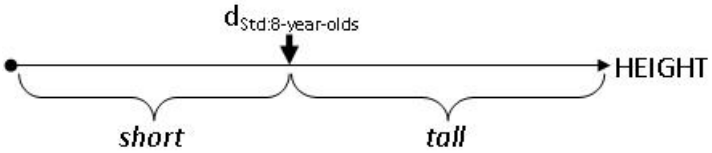
[1] Here I am in particular considering what Kennedy [13] calls relative gradable adjectives. Absolute gradable adjectives such as *straight* and *dry*, whose standards appear to reference endpoints on a scale, and which typically do not occur with *for*-phrases, exhibit different properties. I do not attempt to treat this class here.

Suppose, as is commonly done, that the entry for the negative antonym is identical to that for the positive antonym, with the exception that the 'greater than or equal to' operator is replaced by 'less than or equal to':

(7) $[\![\text{short}]\!] = \lambda d \lambda x. HEIGHT(x) \leq d$

If we take the standard of comparison in both cases to be a single point $d_{Std:C}$ provided by the comparison class, as in (8), the positive and negative antonyms are then defined essentially as complementaries, dividing the semantic space completely between them.

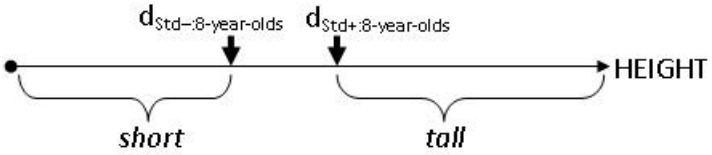
(8)



Intuitively, pairs such as *tall* and *short* are instead contraries, in that there is a range of heights for which both (6a) and (6b) would be judged false (Cruse [6]). This is of course supported by the felicity of conjunctions such as *Fred isn't tall, but he's not short either.*

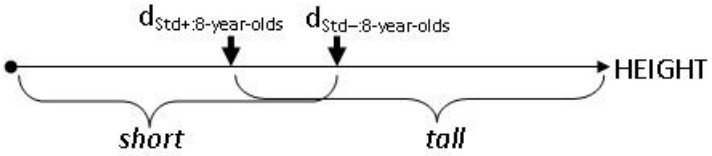
On the other hand, if *tall* and *short* are taken to invoke different standards, as in (9), these can be set in such a way as to establish a 'gap' between the positive and negative antonym:

(9)



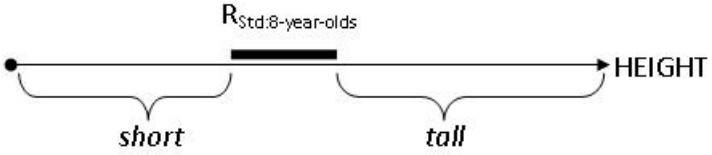
But now we face the more serious question of why these two standards always seem to stand in the same relationship to one another, namely $d_{Std+:C}$ always being higher than $d_{Std-:C}$. Short of stipulation, there is nothing obvious that rules out the possibility that, for some adjectives or in some contexts, the position of the two standards might be reversed, which would allow the truth of a sentence such as *Fred is both tall and short for an 8-year-old.*

(10)



These objections are overcome if the standard of comparison is taken to be a range $R_{Std:C}$ rather than a point, as proposed by von Stechow [18]:

(11)



The range specified in (11) encodes the intuitive gap between the positive and negative antonyms. Furthermore, if the range is taken to contain the average (mean or median) over the comparison class, we have an explanation for examples such as (5) above, in that the lower bound for the positive member of the pair will be higher than the average.

2.2 Standards and distributions

Support for a range-based standard, and a clue to its relationship to the comparison class, is provided by a brief example. Consider the sentences in (12), based on examples from Kennedy [13].

(12) a. Sue's apartment is expensive for an apartment on this street
b. Paul's apartment is inexpensive for an apartment on this street

Suppose that it is the case that Sue's rent is 800 €, Paul's rent is 600 €, and the median rent on this street is 700 €. Are the sentences in (12) true? The answer, I believe, is that it depends. Specifically, it depends on the amount of variation in the rents of apartments on the street in question. If the vast majority of apartments on this street rent for between 650 € and 750 €, we are likely judge both (12a) and (12b) to be true, given that both Sue's and Paul's rents fall outside of this typical range (Sue's on the high side, Paul's on the low side). But now suppose that there is greater variation in the rents on the street (say, rents anywhere between 500 € and 1000 € are common). Then it seems that (12a,b) would no longer be judged true, despite the fact that neither the average rent nor the values corresponding to Sue and Paul have changed.

This example demonstrates that the comparison class provides statistical information that serves to determine the thresholds for adjectives such as *expensive* and *inexpensive*. Specifically, what is relevant is not only a central value, but also some measure of the extent of dispersion of values corresponding to members of the comparison class.

Returning to the previously introduced idea of a standard as a range of degrees, we can now be more explicit. The standard range R_{Std} can be defined as a central range whose width is dependent on the degree of dispersion in the comparison class. This may be formalized by borrowing two statistical concepts, the median and the median absolute deviation (MAD); the latter is a measure

of dispersion around a median, parallel to the standard deviation as a measure of deviation around a mean.

For the examples in (12), we then have the following:

(13) $R_{Std:apt.on.this.street} = median_{x:apt.on.this.street(x)}COST(x)$
$\pm n \bullet MAD_{x:apt.on.this.street(x)}COST(x)$

Here R_{Std} is defined as a range around the median value over the comparison class, in this case apartments on this street. If we imagine the measures of members of the comparison class to be normally distributed, then R_{Std} corresponds to the central peak of the bell curve, and will be narrower or wider depending on how peaked or flat that curve is.

We could perhaps have used the mean rather than the median, but means are more sensitive to extreme high or low values. My own intuition is that it is the distribution of apartments, and not the distribution of prices, that determines the truth or falsity of examples such as (12); this makes a median more appropriate than a mean.

In (13), the parameter n reflects indeterminacy in the number of cases whose values are within R_{Std}. In a symmetric distribution, the central fifty percent of cases fall within one MAD of the median. If we are satisfied in letting *expensive (for an apartment on this street)* pick out the highest-priced quartile of apartments, and *inexpensive (for an apartment on this street)* pick out cheapest quartile, then n may be set at 1. If we wish to allow a greater number of cases to count as *expensive/inexpensive*, then n must be set at some value less than one. The latter seems to me intuitively correct. Recall also that the children in Barner & Snedeker's [2] study typically labeled the tallest third of objects as *tall*, which similarly would imply a value less than one for n.

The more general case is the following, where MEAS stands for a measure function (a function that relates individuals to degrees on the scale of some relevant dimension).

(14) $R_{Std:C} = median_{x \in C}MEAS(x) \pm n \bullet MAD_{x \in C}MEAS(x)$

The formula in (14) is admittedly complex, and it might be tempting to simplify it to something along the lines of (15), where $R_{Std:C}$ is defined as the median plus or minus some value calculated as a proportion of the median:

(15) $R_{Std:C} = median_{x \in C}MEAS(x) \pm n \bullet median_{x \in C}MEAS(x)$

But this is not adequate. The width of the range in (15) fails to factor in the degree of dispersion in the comparison class. As demonstrated in the discussion of the examples in (12), dispersion in the comparison class is relevant to judgments of truth and falsity. Thus if we want to capture speakers' intuitions on the interpretation of the positive form via the definition of a standard degree or set of degrees, we need to posit an entry along the lines of (14), and not the simpler (15). I will return to this point below.

Finally, it is worth pointing out that the formulation of the standard of comparison developed here is consistent with recent theories of vagueness which

define the semantics of vague predicates relative to a 'significant' degree of the property in question. Fara [7] in particular makes the notion of significance central to her theory of vagueness, proposing for example that *a lot* is interpreted as 'significantly more than some norm', where the norm depending on the situation might be what is expected, what is typical, what is needed or wanted, etc. Kennedy [13] builds on this view by proposing that the positive form of a gradable adjective is true of an individual if it has a sufficient degree of the given property to stand out in the context. Importantly, from a statistical perspective, what qualifies as significant is defined in terms of deviation around a central value, just as has been done in (14) above.

3 The integration of the *for*-phrase

3.1 Kennedy (2007) and the presuppositionality of the *for*-phrase

In the preceding section I argued that the comparison class introduced by the *for*-phrase provides statistical information on the basis of which a standard of comparison can be calculated. In the present section, I consider the question of how this information is integrated compositionally.

Kennedy [13] makes the important observation that *for*-phrases are presuppositional in nature. As examples, (16) presupposes that Fred is 8 years old (it would be infelicitous if he were older or younger); (17) presupposes that Kyle's car is a Honda; the infelicity of (18) can be attributed to presupposition failure.

(16) Fred is tall for an 8-year-old

(17) Kyle's car is expensive for a Honda

(18) ??Kyle's BMW is expensive for a Honda

Thus the inclusion of a *for*-phrase actually has two effects semantically: it introduces a comparison class (and the statistical information it provides) while at the same time contributing a presupposition to the resulting sentence.

Kennedy captures this combined role with an analysis that takes the *for*-phrase to introduce a domain restriction on the gradable expression. On this account, gradable adjectives denote measure functions (functions from individuals to degrees); *tall*, for example, denotes a function from individuals to their heights (19). The *for*-phrase composes directly with the gradable adjective by contributing a domain restriction; *tall for an 8-year-old* thus comes to denote a function from 8-year-olds to their heights (20). Finally, a null degree morpheme POS (for 'positive') takes the adjective as argument, and returns a predicate over individuals, which includes a standard of comparison calculated as a function of the gradable adjective. Crucially, in the case involving a *for*-phrase, the standard-calculating function $\boldsymbol{s}$ operates on the domain-restricted expression, thereby incorporating the domain into the standard-setting procedure. Thus *POS tall for an 8-year-old* is a predicate true of an 8-year-old if his or her height exceeds the value that would be considered significant for an 8-year old (21).

(19) $[\![tall_{\langle ed \rangle}]\!] = \lambda x.tall(x)$

(20) $[\![tall\ for\ an\ 8\text{–}year\text{–}old_{\langle ed \rangle}]\!] = \lambda x : 8\ years\ old(x).tall(x)$

(21) $[\![POS\ tall\ for\ an\ 8\text{–}year\text{–}old_{\langle et \rangle}]\!] =$
$= \lambda y.(\lambda x : 8\text{–}years\text{–}old(x).tall(x))(y) > \mathbf{s}(\lambda x : 8\text{–}years\text{–}old(x).tall(x))$

Yet appealing though this approach is, it is less clear how it would deal with examples such as the following:

(22) a. For a lawyer, Bill is poor
b. For a lawyer, Bill has a small salary
c. For a lawyer, Bill is poorly paid
d. For a lawyer, Bill doesn't earn much money

Example (22a) predictably has the presupposition that Bill is a lawyer, which under Kennedy's analysis could be captured as a domain restriction on the gradable adjective *poor*. But (22b-d) share the same presupposition. In these cases this presupposition cannot easily be analyzed as a domain restriction, in that the subject of whom the presupposition holds (Bill) is not an argument of the gradable expression (*small*, *poorly* and *much*, respectively).

One might attempt to get around this problem by proposing (as suggested by Kennedy himself) that the domain restriction need not be identical with the denotation of the nominal in the *for*-phrase, but rather a function of it. In (22b), for instance, suppose that the domain of *small* is restricted to the salaries of lawyers. Then after further semantic composition, *has a small salary for a lawyer* comes to denote a predicate that is true of an individual if he has a salary which falls within the extension of the domain-restricted predicate *small*; since only lawyers have salaries of lawyers, the result is that the subject (here, Bill) is by presupposition a lawyer.

But this would not suffice to rescue an example such as the following:

(23) Sara reads difficult books for an 8-year old

Here we have the characteristic presupposition that Sara is eight years old. Suppose that we again attempt to capture this with a restriction on the domain of *difficult* to books read by eight-year-olds. The sentential predicate is thus true of an individual if she reads books which are in the extension of the domain-restricted *difficult* (which by presupposition are books that are read by eight-year-olds). But here, there is no resulting presupposition that the subject herself is eight years old, the key fact being that one does not need to be eight years old to read books read by eight-year-olds.

A different sort of problem is posed by examples such as these:

(24) a. The store is crowded for a Tuesday
b. For a Sunday, there aren't many cars in the parking lot

Here we seem to have comparison classes of times, and correspondingly presuppositions on the time of utterance. For example, (24a) presupposes that the time of utterance is a Tuesday (as evidence, it would be infelicitous if uttered on a Friday). We might seek to capture this with a domain restriction over times:

(25) $[\![crowded\ for\ a\ tuesday_{\langle i,ed\rangle}]\!] = \lambda t : tuesday(t)\lambda x.crowded(x)(t)$

But it is not clear how the standard-setting function $\boldsymbol{s}$ could pick out a significant degree $\mathbf{s}(\lambda t : tuesday(t)\lambda x.crowded(x)(t))$ independently of the type e entity of which *crowded* is predicated.

Note also that the *for*-phrase can - and in some cases, must - be separated from the gradable expression, unexpected if they form a constituent:

(26) a. (For an 8-year-old,) Fred is tall (for an 8-year-old)
b. (For an amateur,) Martha is a good (*for an amateur) golfer (for an amateur)
c. (For a politician,) George doesn't have many (*for a politician) friends (for a politician)

Finally, on Kennedy's account, where the *for*-phrase composes with the gradable adjective before the latter combines with degree morphology, it is to be expected that *for*-phrases could occur with any degree modifier, and not only with the null positive morpheme POS. But examples such as the following are ungrammatical:

(27) a. *Fred is taller than Sam for an 8-year-old
b. *Fred is as tall as Sam for an 8-year-old
c. *Fred is that tall for an 8-year-old
d. *Fred is 1,2 m tall for an 8-year-old

To be certain, *for*-phrases are not exclusively limited to occurring with the adjective in its positive form. Bale [1] discusses examples of *for*-phrases in comparatives such as (28) where the adjective or the comparison class differ between main clause and *than*-phrase:

(28) a. ?Fred is taller for a boy than he is wide for a boy
b. John is taller for a man than Mary is for a woman

For-phrases are also at least marginally acceptable with *too* (e.g. *?Fred is too tall for a jockey*). But these further examples reinforce that the felicitous occurrence of a *for*-phrase is dependent on the degree morpheme and the rest of the degree construction (e.g., the nature the of the *than*-clause).

In short, once we consider a broader range of examples, it becomes clear that the *for*-phrase cannot be analyzed as introducing a domain restriction on the gradable adjective. But then what alternative will capture its dual role as standard-setter and presupposition trigger?

3.2 The *for*-phrase and POS

In developing an alternate compositional analysis of the *for*-phrase, it is helpful to consider some parallel cases of degree constructions where a phrasal constituent serves to specify a threshold degree. First, in their tendency to be extraposed (cf. (26)), *for*-phrases behave a lot like *than*-phrases in comparatives and *as*-phrases in equatives:

(29) a. Martha is a better (*than George) golfer (than George)
b. Martha is as good (*as George) a golfer (as George)

It is common to analyze *than*-phrases as arguments of the comparative morpheme *-er*. Bhatt & Pancheva [4] argue that their seemingly extraposed position marks the scope of *-er*, in that the *than*-phrase is merged counter-cyclically after *-er* has raised from its base-generated position. In the case of the positive (unmodified) form of the adjective, there is of course no overt degree morphology. But a tradition going back to Cresswell [5] holds that the semantics of the positive form involves a phonologically null degree morpheme POS (cf. the discussion of Kennedy's [13] analysis in Section 3.2; see also von Stechow [18], Heim [11], Fults [8]). The parallel between *for*-phrases on the one hand and *than*- and *as*-phrases on the other thus suggests that the *for*-phrase might similarly mark the scope of, and be interpreted in relation to, null POS.

Kennedy [13] argues against analyzing the *for*-phrase as an argument of POS, citing among other reasons that this does not explain its presuppositional behavior. But in this respect there is a relevant parallel in the superlative, which exhibits presuppositions very similar to those discussed here. On one reading (the so-called relative reading; see especially Szabolcsi [19], Heim [9]), superlatives such as those in (30) are interpreted as conveying that the subject has a higher degree of the property in question than any other member of some contextually relevant comparison class. The comparison class may optionally be made explicit with an *of*-phrase, as in (31):

(30) a. Fred is the tallest student
b. John read the longest book
c. Sue's apartment is the most expensive
d. George has the fewest friends

(31) a. Fred is the tallest of the students in the second grade class
b. John read the longest book of anyone in the class
c. Of the apartments on this street, Sue's is the most expensive
d. George has the fewest friends of any politician I know

Importantly, just as in the case of the *for*-phrase, the subject in the superlative examples is presupposed to be a member of the comparison class (regardless of whether or not this comparison class is made overt). For example, Fred in (31a) is by presupposition a student in the second grade class; George in (31d) is a politician I know, and so forth.

Heim [9] proposes that the superlative morpheme *-est* takes a covert comparison class argument, as reflected in the the following entry, where C is a variable over comparison classes, P denotes a relationship between degrees and individuals (type $\langle d, et\rangle$), and x is by presupposition an element of C:

(32) $[\![\text{-}est]\!] = \lambda C_{\langle et\rangle}\lambda P_{\langle d,et\rangle}\lambda x : x \in C.\exists d[P(x,d) \wedge$
$\forall y[y \neq x \wedge y \in C \rightarrow \neg P(y,d)]]$

Building on Heim's approach, a parallel entry can be proposed for the null morpheme POS, in which it takes a comparison class as argument, and introduces the standard R_{Std} whose definition was developed in the previous section:[2]

(33) $[\![POS]\!] = \lambda C_{\langle et\rangle}\lambda P_{\langle d,et\rangle}\lambda x : x \in C.\forall d \in R_{Std:C}\,[P(x,d)]\,,$

where $R_{Std:C} = median_{y\in C}(max(d)\,[P(y,d)])$
$\pm n \bullet MAD_{y\in C}(max(d)\,[P(y,d)])$

In cases with an overt *for*-phrase, I take this to provide the comparison class argument; this implies that *for* itself is semantically inert (though see below for an alternate possibility). As for how the *for*-phrase, and thus the comparison class, is compositionally integrated, I follow Bhatt & Pancheva's [4] analysis of the comparative morpheme *-er* in proposing that POS originates in the specifier position of the gradable adjective, but raises to a position right-adjoined to VP, at which point the *for*-phrase is merged in its specifier position. (On this analysis, the base position of the *for*-phrase is at the right edge of the VP; when it occurs sentence-initially, this is the result of further movement.)

For a simple example such as (34a), we then have the LF in (34b); the semantic derivation proceeds as in (35):

(34) a. Fred is tall for an 8-year-old
b. Fred $[_{VP}[_{VP}$ is t_i tall$]$ $[_{DegP}$ POS$_i$ [for an 8-year-old]]]

(35) $[\![is\ t_i\ tall]\!] = \lambda d\lambda x.HEIGHT(x) \geq d$

$[\![POS_i\ for\ an\ 8\ year\ old]\!] =$
$= \lambda P_{\langle d,et\rangle}\lambda x : 8.year.old(x).\forall d \in R_{Std:8.year.olds}\,[P(x,d)]$

$[\![is\ t_i\ tall\ POS_i\ for\ an\ 8\ year\ old]\!] =$
$= [\![POS_i\ for\ an\ 8\ year\ old]\!]\,([\![is\ t_i\ tall]\!])$
$= \lambda x : 8.year.old(x).\forall d \in R_{Std:8.year.olds}\,[HEIGHT(x) \geq d]\,,$

where $R_{Std:8.year.olds} =$
$= median_{y:8.year.old(y)}(max(d)\,[HEIGHT(y) \geq d])$
$\pm n \bullet MAD_{y:8.year.old(y)}(max(d)\,[HEIGHT(y) \geq d])$

[2] Fults [8] similarly concludes on the basis of syntactic and semantic tests that the *for*-phrase is an argument of POS.

On this account, *tall for an 8-year-old* is a predicate true of an 8-year-old if his height exceeds the median plus n•MAD in height over all 8-year-olds. While this is little different from what would obtain if the *for*-phrase were analyzed as a domain restriction on the adjective *tall*, a difference emerges when we consider cases in which the subject of the presupposition is not an argument of the gradable adjective; recall that these cases were problematic for Kennedy's analysis. The crucial aspect of the present approach is that the presupposition is defined on the type e argument of POS, and not on the argument of the gradable adjective. To return to an earlier example, we have the following:

(36) a. Sara reads difficult books for an 8-year-old
b. Sara $[_{VP}[_{VP}$ reads t_i difficult books$]$ $[_{DegP}$ POS_i [for an 8-year-old]]]

(37) $[\![reads\ t_i\ difficult\ books]\!] = \lambda d \lambda x.DIF(books\ read\ by\ x) \geq d$

$[\![reads\ t_i\ difficult\ books\ POS_i\ for\ an\ 8\ year\ old]\!] =$
$= \lambda x : 8.year.old(x).\forall d \in R_{Std:8.year.olds}\,[DIF(books\ read\ by\ x) \geq d]\,,$

where $R_{Std:8.year.olds} =$
$= median_{y:8.year.old(y)}(max(d)\,[DIF(books\ read\ by\ y) \geq d])$
$\pm n \bullet MAD_{y:8.year.old(y)}(max(d)\,[DIF(books\ read\ by\ y) \geq d])$

Here we derive a predicate that is true of an 8-year-old if the difficulty of books he or she reads exceeds the median plus n•MAD over 8-year-olds in difficulty of books read. Thus just as in the case above, the presupposition that Sara is 8 years old is captured.

Finally, if the last argument of POS is allowed to range over times as well as over individuals, we can also accommodate examples such as (24), where we have a comparison class over times, and a corresponding presupposition regarding time of utterance. Here, it is assumed that POS raises to a higher position, immediately before the integration of the time argument:

(38) a. The store is crowded for a Tuesday
b. $[_{XP}\,[_{XP}$ The store is t_i crowded$]\,[_{DegP} POS_i$ [for a tuesday]]]

(39) $[\![the\ store\ is\ t_i\ crowded\ POS_i\ for\ a\ tuesday]\!] =$
$= \lambda t : tuesday(t).\forall d \in R_{Std:tuesdays}[CROWDED(store)\ at\ t \geq d]$

where $R_{Std:tuesdays} =$
$= median_{t':tuesday(t')} max(d)[CROWDED(store)\ at\ t' \geq d]$
$\pm n \bullet MAD_{t':tuesday(t')} max(d)[CROWDED(store)\ at\ t' \geq d]$

Here, as in the previous cases, R_{Std} is defined in terms of median and MAD over the comparison class; the only difference is that the comparison class in this case is a set of times, such that R_{Std} represents a central range of degrees of crowdedness of the store on Tuesdays.

To summarize this section, modeling the analysis of the positive form on Heim's [9] analysis of the superlative allows a compositional analysis of *for*-phrases that captures the dual role of the comparison class they introduce: determining a standard of comparison, and introducing a presupposition. Furthermore, this analysis is able to handle cases not accounted for by Kennedy [13].

Note in conclusion that I have been maintaining the now-standard view of POS as phonologically null. An alternate possibility is that in cases with an overt *for*-phrase, *for* is actually the spell-out of POS, with the noun phrase following *for* introducing the comparison class argument. Such an analysis would simplify the constituency (in that the first argument of *for*/POS would occur in a linearly adjacent position), and would eliminate the need to posit counter-cyclic merger along the lines of Bhatt & Pancheva [4]. I leave it as an open question as to whether this is the correct analysis; the fundamentals of the account developed above remain unchanged either way.

3.3 No *for*-phrase

Up to this point I have been considering examples with overt *for*-phrases. Let us consider briefly the (more common) situation where a gradable adjective occurs in the positive form without a *for*-phrase to introduce a comparison class. In these cases it is reasonable to assume that there is an implicit comparison class that saturates the C argument of POS (cf. Heim [9] for a similar analysis in the case of the superlative).

Often the context is sufficient to specify the appropriate comparison class. For example, if an elementary school teacher remarks, upon meeting a new pupil, *Fred is tall*, the natural interpretation is that he is tall relative to boys of his age. But in other cases the context leaves multiple possibilities open, and in this case disagreement between speakers can arise. We might, for example, disagree as to whether a particular apartment could be called expensive, the source of the disagreement being that we have different frames of reference or comparison classes in mind (for example, apartments on this street vs. apartments rented by students). Presumably this is not all that common in practice, in that we seem to be able to understand each other without too much trouble when we use gradable adjectives.

In the literature on comparison classes (e.g. Klein [14]), they have typically been conceptualized as sets of individuals. But consideration of examples such as *the store is crowded for a Tuesday* has led us to broaden the view of comparison classes to include also sets of times. With this expanded view, sentences that at first do not seem to lend themselves to a comparison class analysis in fact are amenable to this approach. For example, *the store is crowded today* has a reading (probably the most natural one) that does not involve the comparison of 'the store' to other locations, but rather a comparison of 'today' to other days. This reading cannot be captured via a traditional view of a comparison class over individuals, but as shown above in (38) can be handled with a comparison class over times.

There may be other possibilities as well. Fara [7] cites the following example: I am throwing a huge party, and my refrigerator is full of beer I have bought for the guests. My friend looks in the refrigerator and exclaims "Wow, that's a lot of beer." Fara proposes that *a lot of beer* can be interpreted as 'significantly more beer than one typically finds in a refrigerator'. But this intuition could be restated using the language of comparison classes: considering situations of refrigerators stocked with beer, the present case is at the high end in terms of amount of beer. In other words, we also seem to have comparison classes over something like situations.

Finally, there is a technical point that requires discussion. In the examples discussed in (34)-(38), POS is interpreted with wider scope than its base-generated position, the result of raising at LF. But with the semantics given in (33), once the comparison class argument of POS is saturated, it could combine *in situ* with a gradable adjective:

(40) $[\![\text{C-POS tall}]\!] = [\![\text{C-POS}]\!]([\![\text{tall}]\!])$
$= \lambda P \lambda x : x \in C . \forall d \in R_{Std:C} [P(x, d)](\lambda d \lambda x . HEIGHT(x) \geq d)$
$= \lambda x : x \in C . \forall d \in R_{Std:C} [HEIGHT(x) \geq d]$

The existence of this possibility gives rise to two questions. First, why does POS raise at all, given that it may be interpreted *in situ*? And secondly, recall from (26) that a *for*-phrase often cannot occur directly adjacent to the gradable expression; this is the case in particular with modified nominals, where the *for*-phrase appears either to the right of the noun or sentence initially:

(41) a. (For an 8-year old,) Fred is a tall (*for an 8-year old) boy
b. (For an amateur,) Martha is a good (*for an amateur) golfer (for an amateur)

If the *for*-phrase marks the semantic scope of POS, and POS can be interpreted locally to the gradable adjective, why do we not find a *for*-phrase in this position?

There is an obvious possibility here: when POS is interpreted *in situ*, the modified nominal provides the comparison class. This is assumed by Cresswell [5]. And by way of parallel, Heim [9] makes a similar claim about the superlative. Recall that the relative reading of the superlative discussed above involves the superlative morpheme *-est* taking scope outside of the DP; in this case, the comparison class is provided by the context, or by an *of*-phrase. For example, on the relative reading *John climbed the highest mountain* means that he climbed a higher mountain than did any other member of some contextually salient group. But *-est* can also remain within the DP, and in this case the comparison class is equated to the denotation of the modified nominal. The result is what Heim terms the absolute reading. For example, on the absolute reading of *John climbed the highest mountain*, the comparison class is mountains, and the resulting meaning is that John climbed the highest mountain of all, i.e. Mt. Everest.

We might propose a similar story in the case of POS: when it is interpreted *in situ*, the comparison class is set equal to the modified nominal, making a

for-phrase superfluous. The issue with this, as pointed out by Kennedy [13], is that modified nominals do not exhibit the same presuppositional behavior as *for*-phrases. For example, (42a) is a presupposition failure; but (42b) is not:

(42) a. ??That's not large for a mouse. It's a rat.
b. That's not a large mouse. It's a rat.

While I do not have a full explanation for this difference, there are a couple of relevant observations that can be made.

First, in the case of a modified nominal, the superlative also allows a non-presuppositional reading; for example, (43) does not seem to involve presupposition failure:

(43) Pluto isn't the smallest planet. It's not a planet at all.

And secondly, while (42b) demonstrates that something like *is a large mouse* can have a non-presuppositional reading, it does not rule out the possibility of a presuppositional reading as well, the one predicted if the nominal saturates the comparison class argument of POS. For example, on the readings brought out by the continuations given, all of the examples in (44) can be analyzed as presupposing that 'that' is a mouse.

(44) a. That's a large mouse.
b. That's not a large mouse. It's fairly average in size as mice go.
c. Is that a large mouse? I don't know anything about how big mice get.

The source of the non-presuppositional readings in examples such as (42b) and (43) is not clear. One possibility is that these examples should be analyzed as something other than predicational in nature. I will not attempt to pursue this here. But to address the issue raised above, I conclude tentatively that in the case of modified nominals, POS can in fact occur *in situ* with the nominal saturating the comparison class argument slot; this restricts the occurrence of a *for*-phrase to cases where POS has higher scope, and thus the comparison class must be specified in some other way.

4 Degrees and individuals

The primary goal of this paper has been to explore the role of comparison classes in the semantics of gradable adjectives in their positive form, focusing on what information the comparison class contributes to the truth conditions, and how this may be given a formal, compositional implementation within a degree-based semantics. I have shown that the positive form can receive an analysis modeled on recent treatments of the superlative, in which the comparison class (either provided by a *for*-phrase or contextually supplied) is an argument of a null degree morpheme POS, and provides as a standard of comparison a range of degrees

around a central value. The parallel between the positive and the superlative is a meaningful one, in that it suggests that there is not such a fundamental difference between the case where there is overt degree morphology (the superlative) and the case where there is not (the positive). That is, within a degree-based framework, the positive form does not require any exceptional treatment beyond the sort required for other types of degree constructions.

But there are a couple aspects of the present analysis that might be criticized as not entirely satisfying. First, as discussed Section 2, the definition of the standard range R_{Std} must be stated in fairly complex terms, incorporating two statistical measures (the median and the median average deviation) as well as the parameter n. And secondly, in the formalization developed in Section 3, it must be stipulated in the semantics for the positive morpheme POS that the subject of the resulting predicate is a member of the comparison class. To be certain, this stipulation has a parallel in a similar restriction on the superlative, and it is reasonable to think the two patterns are related. But why things should be like this is less clear.

I would like to suggest that both issues stem from the same source. The analysis of the positive form developed above states its truth conditions in terms of relationships between degrees. But to get the facts right, we actually need to keep track of individuals. That is, to appropriately set the thresholds for the application of a gradable adjective such as *expensive* or *tall*, it is necessary to factor in how the individuals in the comparison class are distributed with respect to the dimension in question (e.g. cost or height): are they clustered closely together, or more dispersed? And we further need to establish that a particular individual (in most of our examples, the sentential subject) is a member of the comparison class. The complexities and stipulations discussed above are simply what is needed within a degree-based framework to establish these relationships between individuals. But perhaps these complications could be avoided if the truth conditions of sentences involving gradable adjectives in their positive form were stated in terms of individuals, and not degrees.

As discussed briefly in the introductory section of this paper, this is precisely at the core of the delineation-based approach to vagueness and gradability, a leading alternative to the degree-based framework. In the seminal work in this tradition, Klein [14] proposes that gradable adjectives denote simple one-place predicates (i.e., without any sort of degree argument), which differ from ordinary one-place predicates in being partial functions which are dependent on a contextually determined comparison class. Thus a gradable adjective such as *tall* partitions the comparison class into three disjoint sets: a positive extension, a negative extension and an extension gap (individuals of whom the predicate is neither true false).

It is beyond the scope of this paper to develop an alternative delineation-based analysis of the facts discussed here. But to sketch out in rough form what such an analysis might look like, we might follow Klein's general approach and

take a gradable adjective and antonym pair to be interpreted relative to a comparison class, and to partition that set into three subsets.[3] For example:

(45) a. $[\![tall(C)]\!] = \{x : x \textit{ is one of the tallest } C's\}$

b. $[\![short(C)]\!] = \{x : x \textit{ is one of the least tall } C's\}$

c. $GAP = C - ([\![tall(C)]\!] \cup [\![short(C)]\!])$

If we establish some rough standard for what proportion of the comparison class must fall within each of these three sets (say, one third in each), we capture the intuition that the degree of dispersion in the comparison class is relevant to what counts as tall or short (cf. the discussion of example (12)).

An analysis along the lines of (45) would eliminate the need to build complex statistical measures into the semantics of the positive form. Beyond this, it would have the benefit of capturing with one mechanism the dual semantic role of the comparison class. First, the comparison class in essence sets the standard of comparison, because it is the members of this set that are being sorted or grouped. And secondly, the subject must be a member of that comparison class (e.g. only an 8-year-old can appear within a ranking of 8-year-olds).

The possibility of giving a simpler and more intuitive analysis of the positive form would seem to represent an advantage for the delineation-based framework over the degree semantics I have assumed in this paper. But the greater simplicity in this one area comes with a cost elsewhere. Specifically, the analysis represented in (45) removes reference to degrees from the lexical entry of the gradable adjective. But there is little doubt that the semantics of gradable adjectives must sometimes involve reference to degrees. The most obvious examples are constructions with measure phrases (*Fred is 1,80 meters tall*; *Sue's car cost 1000 euros more than Paul's*), but also perhaps what Kennedy [13] terms absolute gradable adjectives, i.e. adjectives such as *straight* or *full* whose standards seem to be defined in terms of endpoints on a scale, rather than orderings of individuals. Degrees must therefore enter the semantic representation somehow, perhaps via the semantics of measure phrases themselves (as proposed by Klein). The result will be a system in which truth conditions for gradable adjectives are sometimes stated in terms of orderings of individuals and sometimes in terms of degrees. While this is certainly not unthinkable, it contrasts with the more unified account possible within a degree-based theory. The challenge for the delineation-based approach would be to show that these two types of representations can be connected in a satisfying and compositional way.

[3] Klein states his analysis in terms of adjectives and their negations. He does not explicitly discuss the relationship between the negation of an adjective (e.g. *not tall*) and its antonym (e.g. *short*). This in itself is an interesting topic for further study. But as it is the latter that is relevant to the facts discussed here, I modify Klein's treatment somewhat.

5 Conclusion

Comparison classes play an important role in the interpretation of gradable adjectives such as *tall*, *expensive* and *crowded*. The choice of the comparison class - be it a set of individuals, of times or perhaps of situations - and the distribution of individuals within that class have a truth conditional effect. Whether one approaches the data from the perspective of a semantics based on degrees or from some alternative perspective, this effect must be represented.

Focusing on cases involving an overt *for*-phrase, I have in this paper developed a novel analysis of the comparison class which is able to overcome several issues with Kennedy's [13] recent analysis, while also extending to cases that have not previously been considered as falling within this type of approach. While these are undoubtedly not the last words that will be written on this subject, the present work has perhaps helped to move the discussion further.

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