Introduction

The starting point:

(1) a. Clyde is six feet taller.
   b. Clyde is taller by six feet.

(2) a. Clyde is six feet tall.
   b. *Clyde is tall by six feet.

What accounts for this contrast? How do by measure phrases work?

A larger issue, to which the contrast in (1–2) is related:

(3) a. six feet tall
   b. 40 years old
   c. 20 minutes long

(4) a. six feet taller
   b. 40 years older
   c. 20 minutes longer

Measure phrases of the sort in (3) are often taken to be prototypical. But in fact, measure phrases of the sort in (4)—ones that occur with comparatives—may be more basic[1].

Roadmap:

• argue that facts about by measure phrases—and other kinds of measure phrases, too—suggest measure phrases are differential by default
• some background in degree semantics
• consider some theoretical tools for approaching the problem here
• the proposal: differential degrees are discontinuous extents
• wild speculation

2 Some Data

2.1 By Measure Phrases

By MPs occur in a number of syntactic categories:

(5) a. Floyd is taller than Clyde by six inches.
   b. This board is longer by six inches.

(6) a. Floyd was late by 15 minutes.
   b. That book is overdue by six days.

(7) a. The soup cooled by several degrees.
   b. The meeting was delayed by an hour.

(8) a. The flight is behind schedule by two hours.
   b. The gas station is past the intersection by about a mile.
   c. The arrow is above the target by a few inches.

These are categories that generally accommodate ordinary (bare) MPs—in one form or another—as well:

(9) a. Floyd was 15 minutes late.
   b. That book is six days overdue.
   c. Floyd is six inches taller than Clyde.

Goals:

• develop an account of the grammar of by measure phrases in their adjectival use, and ultimately perhaps more widely
• use this to approach broader questions about measure-phrase modification more generally

(10) a. The soup cooled several degrees.
    b. The meeting was delayed an hour.

(11) a. The flight is two hours behind schedule.
    b. The gas station is about a mile past the intersection.
    c. The arrow is a few inches above the target.

But it’s not the case that by MPs and bare MPs occur with exactly the same predicates.

AP contrasts:

(12) a. Floyd is six feet tall.
    b. *Floyd is tall by six feet.

(13) a. The meeting is an hour long.
    b. *The meeting is long by an hour.

(14) a. Clyde is 40 years old.
    b. *Clyde is old by 40 years.

VP contrasts:

(15) a. Floyd slept six hours.
    b. *Floyd slept by six hours.

    b. *Norma talked by an hour.

In PP, by MPs and bare MPs seem to have a similar distribution. Possible exceptions:

(17) a. The meeting was half an hour ago.
    b. *The meeting was ago by half an hour.

(18) a. The monkey was two meters from the tree.
    b. *The monkey was from the tree by two meters.

The common thread: by MPs do ‘differential measurement’.

- in comparatives, obviously differential
- with ‘inherently comparative’ adjectives like overdue, early, late (Kennedy 2001, Schwarzschild 2006), measuring difference from a standard
- in (the relevant) PPs, measuring relative to a reference point (e.g. behind, past, above)
- in VPs, measuring difference from a standard (in degree achievements like cool, what Kennedy & Levin to appear call ‘measure of change’)

2.2 Possible Connections to Slightly and Somewhat (and Maybe ‘Lexicalized’ MPs)

Slightly and somewhat also have a cross-categorial distribution. These are licensed in some of the contexts where by MPs are licensed, but in many places where bare MPs are not licensed:

Adjectives:

(19) a. Floyd is {slightly somewhat} taller than Clyde.
    b. Floyd is taller than Clyde by several feet.

(20) a. This box is {slightly somewhat} too wide.
    b. This box is too wide by a few centimeters.

These are good only under a ‘tall/wider than suitable’ or ‘too tall/wide’ interpretation:

(21) a. *Floyd is {slightly somewhat} tall.
    b. *Floyd is tall by several feet.

(22) a. *This box is {slightly somewhat} wide.
    b. *This box is wide by a few centimeters.

---

3In the right contexts this may have a ‘too long’ interpretation on which it’s grammatical.
Verbs:

(23) a. The soup cooled \{slightly \ 
    somewhat \}. 
    b. The soup cooled by several degrees.  

(24) a. The meeting was delayed \{slightly \ 
    somewhat \}. 
    b. The meeting was delayed by an hour.  

(25) a. *Floyd slept \{slightly \ 
    somewhat \}. 
    b. *Floyd slept by six hours.  

(26) a. *Norma talked \{slightly \ 
    somewhat \}. 
    b. *Norma talked by an hour.  

Prepositions:

(27) a. The flight is \{slightly \ 
    somewhat \} behind schedule. 
    b. The flight is behind schedule by two hours.  

(28) a. The gas station is \{slightly \ 
    somewhat \} past the intersection. 
    b. The gas station is past the intersection by about a mile.  

(29) a. The arrow is \{slightly \ 
    somewhat \} above the target. 
    b. The arrow is above the target by a few inches.  

(30) a. *The meeting was \{slightly \ 
    somewhat \} ago. 
    b. *The meeting was ago by half an hour.  

(31) a. *The monkey was \{slightly \ 
    somewhat \} from the tree. 
    b. *The monkey was from the tree by two meters.  

So \textit{slightly} and \textit{somewhat} are at least plausibly differential in the same sense that \textit{by} MPs are. Taking this view would entail having to explain examples like (32), though:

(32) a. Floyd is \{slightly \ 
    somewhat \} \{ugly \ 
    insane \}. 
    b. This law is \{slightly \ 
    somewhat \} \{ridiculous \ 
    stupid \}.  

Certain apparent bare MPs—\textit{a little}, \textit{a bit}—seem to behave roughly as \textit{slightly} and \textit{somewhat} do. These apparent MPs seem lexically fixed in some way:

(33) a. \{a little \ 
    a bit \} ugly 
    b. *\{not a lot \ 
    a lot \} ugly 
    c. \{a little bit \ 
    a tiny bit \*a small bit \ 
    *an extremely little bit \} ugly  

Their distribution is broadly similar to that of \textit{by} MPs:

(34) a. Floyd is \{a little \ 
    a bit \} taller than Clyde. 
    b. This box is \{a little \ 
    a bit \} too wide.  

(35) a. *Floyd is \{a little \ 
    a bit \} tall. 
    b. *This box is \{a little \ 
    a bit \} wide.  

(36) a. The flight is \{a little \ 
    a bit \} behind schedule. 
    b. The gas station is \{a little \ 
    a bit \} past the intersection.  

\textsuperscript{4}Again, these are only good on a 'too tall' reading.
c. The arrow is \{a little a bit\} above the target.

(37) a. *The meeting was \{a little a bit\} ago.
b. *The monkey was \{a little a bit\} from the tree.

These lexical MPs differ from *slightly and by MPs in their behavior in the verbal domain:

(38) a. The soup cooled \{a little a bit\}.
b. The meeting was delayed \{a little a bit\}.

(39) a. Floyd slept \{a little a bit\}.
b. Norma talked \{a little a bit\}.

I don’t know why there should be this difference between the behavior of lexicalized MPs and *slightly/somewhat. More generally, lexicalized MPs give rise to various idiosyncrasies that deserve separate consideration.

The generalizations in this section are more brittle and elusive, but: some reasons to think *slightly, somewhat and a little bit like (prefer? must?) do differential measurement. They’re *always good in comparatives.

5For example, a *great deal and a lot are somewhat odd with some PPs (a great deal behind schedule vs a great deal past the intersection), and *much seems largely restricted to AP (Floyd slept much, much past the intersection). Schwarzschild & Wilkinson (2002) suggest that degree much is essentially a kind of mass quantifier, like determiner much, and Schwarzschild (2005) discusses mass quantifiers in the adjectival domain more broadly; Kennedy & McNally (2005) suggest that much is sensitive to whether a standard normally defaults to the bottom of a scale.

2.3 Schwarzschild’s Bare MP Observations

Schwarzschild (2005): Adjectives in general permit bare MPs with the comparative, but there are many that do not permit MPs with the non-comparative form:

(40) a. *6 lbs heavy/light
b. *30 degrees hot/cold/warm
c. *80 mph fast/slow
d. *$5 cheap/expensive
e. *2 inches big/small
f. *3 shades dark/light
g. *50 decibels loud/soft
h. *$106 rich/poor
i. *20 IQ points intelligent/stupid
j. *2 percentage points likely
k. *2 degrees acute
l. *200 pounds fat/thin
m. *The winds are 25 mph strong.

n. *30 miles close/far/near
o. *600 watts powerful
p. *20 points popular

These are all good in the comparative.

So: MPs are possible with comparative adjectives in general, but not necessarily with corresponding non-comparative forms. Again, they seem to do differential measurement.

2.4 Beyond English

A number of languages allow MPs with comparatives and with PPs, but do not allow them with non-comparative PPs.

6I will try to avoid the terms ‘positive’ and ‘absolute’ for ordinary morphologically simple non-comparative forms of adjectives here, because (frustratingly) both terms are actually ambiguous in this context. This entails using ‘non-comparative’ to include ‘non-equative’, ‘non-excessive’, etc.

Non-comparative APs:

(41) **POLISH**:  
dwa metry duży  
two meters big

(42) **JAPANESE**:  
kono nekutai-wa 65-inch nagai  
this necktie-TOP 65-inch long

(43) **RUSSIAN**:  
*(na) dva metra vysokij  
(on) two meters tall

(44) **FRENCH**:  
*grand de 1,27m  
big of 1.27m  
‘1.27 meters tall’

Comparatives:

(45) **POLISH**:  
dwa metry większy  
two meters bigger

(46) **JAPANESE**:  
kono nekutai- wa ano nekutai- yori 5-inch nagai  
this tie-TOP that tie- than 5-inch long  
‘This tie is 5 inches longer than that tie.’

(47) **RUSSIAN**:  
a 20 samtimetrov vyshe  
on 20 centimeters taller  
‘20 centimeters taller’

(48) **FRENCH**:  
*plus grand que Marie de 2 centimetres  
more big than Marie of 2 centimeters  
‘2 centimeters bigger than Marie’

PPs:

(49) **POLISH**:  
a. kilka metrów przed szczytem  
several meters from summit  
b. dwa metry od mnie  
two meters from me

(50) **JAPANESE**:  
a. Wells Hall- wa koko- kara 500 fiito hanarete- iru  
Wells Hall-TOP here- from 500 feet away- be  
‘Wells Hall is 500 feet away from here’  
b. kaigi- no 10- ppun mae  
meeting- GEN 10 minutes before

(51) **RUSSIAN**:  
a. (v) 10 metrov za perekrestkom  
10 meters behind intersection  
b. v metrax ot perekrestka  
in meters from intersection  
‘some distance from the intersection’

(52) **FRENCH**:  
a. à 10 mètres de l’intersection  
at 10 meters from the-intersection

So: cross-linguistic data groups comparatives with PPs, excluding non-comparative APs. Same common thread: MPs are systematically possible where there is differential measurement.

2.5 Generalizations and Conclusions So Far

- by MPs and related degree modifiers are possible with comparative APs, PPs, and some VPs, but not with non-comparative APs
- bare MPs are possible with comparative APs, but not with many non-comparative APs that one might have expected to permit them
- in a number of languages, MPs are possible with comparative APs and PPs but not with non-comparative APs
- more generally, then, MPs in comparative APs and PPs and some VPs form a natural class that excludes those that modify non-comparative APs
• MPs in non-comparative APs are the marked case, not only relative to MPs in comparatives (as Schwarzschild 2005 suggests) but also relative to MPs in other syntactic categories as well.

• MPs tend to do differential measurement (in some languages and for by MPs, this is the only option).

3 Theoretical Background

3.1 Degree Semantics in a Nutshell

Gradable adjectives can be understood in terms of scales\footnote{Formally, a dense linearly-ordered set of points.} Representations of measurement on the scales are degrees.

(53) Clyde is taller than Floyd.
   ‘The degree of Clyde’s height is greater than the degree of Floyd’s height.’

(54) Your coffee maker is more expensive than mine.
   ‘The degree of your coffee maker’s expensiveness is greater than the degree of my coffee maker’s expensiveness.’

A natural way of thinking about it:

(55) \[
\begin{array}{c}
\text{HEIGHT SCALE} \\
\text{Floyd’s height} \\
\text{Clyde’s height}
\end{array}
\]

Non-comparative gradable adjectives are vague:

(56) a. Floyd is tall.
    b. Your coffee maker is is expensive.

How expensive do you have to be to be expensive? How tall to be tall? Common way to cope with this: these compare relative to a contextually-provided standard\footnote{Formally, a dense linearly-ordered set of points.}

(57) Floyd is taller.
   ‘Floyd is taller than the standard for tallness (that we have in mind).’

Interpreting the extended AP (in the spirit of Kennedy 1997 and subsequently, with some modifications; the syntax is in the spirit of Abney 1987, Corver 1990, and Grimshaw 1991):

\[
\begin{array}{c}
\text{DegP}_{(e,t)} \\
\text{Deg}_{(dt,et)} \\
\text{Deg}_{(ed,et)} \\
\text{POS} \\
\text{ AP}_{(e,d)} \\
\text{tall}
\end{array}
\]

This has to be complicated further to accommodate a measure phrase. One option is to distinguish an MP-introducing cousin of POS, MEAS \footnote{Assume more tall is realized as taller for purely morphological reasons—a PF issue.} (Svenonius & Kennedy 2006, more on this below).

A differential comparative:\footnote{For an actual theory of vagueness in this kind of framework, see Kennedy 2007 and the many references there.}

/llbracket tall /rrbracket = \lambda x . \text{tall}(x)
/llbracket \text{POS} /rrbracket = \lambda a(e,d) . \lambda x . a(x) \geq d_s
(59) \[
\begin{array}{c}
\text{[tall]} \\
= \lambda x . \text{tall}(x) \\
= \lambda x . \text{the degree to which } x \text{ is tall} \\
[\text{POS}] = \lambda a(e,d) . \lambda x . a(x) \geq d_s
\end{array}
\]
(59) \[
\begin{array}{c}
\text{[POS tall]} \\
= \llbracket \text{POS} \rrbracket (\llbracket \text{tall} \rrbracket) \\
= \lambda x . \text{tall}(x) \geq d_s
\end{array}
\]

This has to be complicated further to accommodate a measure phrase. One option is to distinguish an MP-introducing cousin of POS, MEAS \footnote{Assume more tall is realized as taller for purely morphological reasons—a PF issue.} (Svenonius & Kennedy 2006, more on this below).

A differential comparative\footnote{For an actual theory of vagueness in this kind of framework, see Kennedy 2007 and the many references there.}
Important departure from what is usual in such a system: I’m treating the MP as denoting a property of degrees rather than a degree. (This reflects that MPs are quantificationally weak: most feet and Floyd’s height are not possible MPs. See Schwarzschild 2005, 2006 and references there for further arguments.)

### 3.2 Degrees are Extents


\[\text{DegP}_{(e,t)}\]

\[\text{DP}_{(d,t)}\]

\[\text{six feet}\]

\[\text{Deg}_{(d,\langle dt,et\rangle)}\]

\[\text{Deg}_{(d,\langle dt,et\rangle)}\]

\[\text{CP}_d\]

\[\text{more}\]

\[\text{tall}\]

\[\text{Deg}_{(ed,\langle d,\langle dt,et\rangle\rangle)}\]

\[\text{AP}_{(e,d)}\]

\[\text{than Floyd (is tall)}\]

#### Kennedy (2001) points out two really nice things that construing degrees as intervals (‘extents’) buys.

**Negative adjectives**

Account of the incompatibility of negative adjectives with MPs:

\(\text{[more]} = \lambda a_{(e,d)} \lambda d \lambda m_{(d,t)} \lambda x . m(a(x) - d)\)

\(\text{[than Floyd (is tall)]} = \text{tall(Floyd)}\)

\(\text{[six feet]}\)

\(= \lambda d . \text{six-feet}(d)\)

\(= \lambda d . \text{d is six feet long}\)

\(\text{[six feet more tall than Floyd (is tall)]}\)

\(= \text{[more]} \text{[tall]} \text{[than Floyd (is tall)]} \text{[six feet]}\)

\(= \lambda x . \text{six feet}(x) - \text{tall}(\text{Floyd})\)

\(= \lambda x . \text{six-feet(tall}(x) - \text{tall}(\text{Floyd})\)

Degrees of tallness can be measured, as illustrated in (64):

\(\text{Degrees of shortness are degrees of ‘not-tallness’. Strictly speaking, they are on another scale, with the ordering reversed.}\)

\(\text{Floyd is six feet tall requires that tall(Floyd) contain the (positive) ‘yardstick interval’ six-feet. But short(Floyd) can’t contain this yardstick interval: it’s not on the same scale. Even if it were, the sentence would necessarily come out false}\)\[1\]

\(\text{11}\) Except in the independently bizarre case that involves a height of 0.
Account of cross-polar anomaly:

(65)  

a. ??Alice is shorter than Carmen is tall.

b. ??New York is safer than Chicago is clean.

c. ??A Volvo is safer than a Fiat is dangerous.

Even if the tallness scale and the shortness scale were identical—they aren’t—cross-polar anomaly would still be expected to be odd in this framework. Comparatives can be understood as claiming that one interval contains another. But a degree of tallness would never normally contain a degree of shortness (and vice versa):

(66)

4 Theoretical Tools and the Problem at Hand: Points, Intervals, and Degree Morphemes

4.1 Schwarzschild (2005): Points vs Intervals

Schwarzschild (2005) proposes an understanding of the unmarked character of MPs in comparatives, which I will build on below.

The core intuition:

(67) ‘If the purpose of a measure phrase is to describe a gap, and comparatives necessarily entail the presence of a gap, it is no surprise that they fit together so snugly.’

To implement this, he treats measure phrases as predicates of intervals on a scale (nothing new, in light of the above):

(68)  

a. John is two inches taller than Mary.

b. two-inches$(\max\{d : \text{tall}(m, d)\}, \max\{d : \text{tall}(j, d)\})$

c. ‘the size of the interval from Mary’s height to John’s height is two-inches’

He treats adjectives themselves as predicates of points on a scale. Thus (69) is correctly predicted to be ill-formed:

(69)  

a. *Mary is 50 pounds heavy.

b. $\exists d[\text{heavy}(m, d) \land 50$-pounds$(d)]$

If $d$ is a point, 50-pounds$(d)$ will be undefined (because 50-pounds is a predicate of intervals); if $d$ is an interval, heavy$(d)$ will be undefined (because heavy is a predicate of points).

What to do for (70), which for the same reasons is also predicted to be bad?:

(70)  

a. *Mary is 5 feet tall.

b. $\exists d[\text{tall}(m, d) \land 5$-pounds$(d)]$

He proposes a lexical rule:

(71) Homonym Rule, from degrees to intervals:

If $A$ has meaning $A'$ that relates individuals to degrees then $A$ has a secondary meaning relating individuals to sets of degrees (intervals). The secondary meaning is given by: $\lambda I \lambda x. I = \{d : A'(x, d)\}$

(72) Homonym Rule applies to tall, wide, deep, thick, old, long, high

12 There is a distinct reading on which these are good for many speakers that involves ‘comparison of deviation’, in Kennedy’s phrase.

13 So long as the tallness is finite and the shortness non-maximal.

14 I’ve changed his logical representation here by replacing some operators with their definitions. I’ve also changed his UpLim upper-limit predicate to MAX, which I think will do the same thing, given that he assumes in this paper that tall is a predicate of points on a scale rather than intervals.
This correctly predicts that MPs in comparatives should be basic, and that MPs in positive forms are marked and require special machinery.

Also, gives substance to the tendency to talk about ‘differential(degree)s’ as though they were an ontologically distinct object from ordinary degrees.

4.2 Degree Morphemes

Svenonius & Kennedy (2006)’s syntax for MP modification:

\[
\text{DegP} \quad \text{Deg} \quad \text{AP} \\
\text{six feet} \quad \text{Deg'} \quad \text{tall} \\
\text{Deg} \quad \text{MEAS} \\
\text{null degree head MEAS specifically for introducing MPs.}
\]

Makes possible explanations in terms of syntactic terms of MP distribution:

- Why not *six pounds heavy? MEAS doesn’t select heavy.
- Why no MPs with positive adjectives in some languages? MEAS doesn’t select comparative morphology in some languages.
- Why by MPs possible where bare MPs aren’t? By MPs aren’t introduced by MEAS.

A related idea: Kennedy & Levin (to appear) observe that in degree achievements, measurement is inherently differential:

\[
\text{The gap boats widened six inches.}
\]

This doesn’t mean that the gap came to be six inches.

Both comparatives and degree achievements involve ‘a difference function with a scale whose minimal element—the ‘derived zero’—corresponds to the degree introduced by’ the standard of comparison. ‘One of the general properties of this morpheme, however, is that it can always combine with difference functions.’

4.3 Worries

On the points vs. intervals approach: How to reconcile the point-based degree semantics of adjectives with arguments that degrees are always intervals (Kennedy 2001, Schwarzschild & Wilkinson 2002, among others)?

In particular: If positive tall and short are predicates of points on a scale, we lose Kennedy (2001)’s explanation of *five feet short and of cross-polar anomaly.

On the degree-morpheme approach:

- The notion of a ‘difference function’ is pretty intuitive, but why would measure phrases (or their associated degree head) tend to insist on this? Why would the default/unmarked case be to measure on a derived scale, and the special/marked case be to measure on a basic scale? Shouldn’t it be the reverse?
- Secondary concern: it is not MPs themselves that require differential measurement, so it’s not clear that this reflects that this is more basic than the alternative (if both require additional degree morphology).

5 Differential Degrees as Discontinuous Extents

5.1 Sorts of Degrees

Desiderata:

- ontological (sortal) distinction between differential and ‘ordinary’ degrees, as in Schwarzschild (2005)
- preserving Kennedy (2001) satisfying account of tall vs. short
- preserving Schwarzschild (2005)’s satisfying account of why MPs by default do differential measurement
One way of thinking about the problem: We’d like for both ordinary and differential degrees to be intervals, as in (75):

\[(75)\]

\[\text{HEIGHT SCALE}\]

\[\text{\texttt{tall}(Floyd)}\]

\[\text{\texttt{tall}(Clyde)}\]

\[\text{\texttt{tall}(Clyde) − \texttt{tall}(Floyd)}\]

But we’d like to do this in a way that allows making a sortal distinction between differential and ordinary degrees.

The representation in (75) does allow making such a distinction: differential degrees are those that start measuring in the middle of a scale.

But why would MPs prefer to measure from the middle, rather than from an endpoint? Why would they be so perverse? (A version of the question above: Why would MPs prefer ‘derived’ scales?)

An answer: Take the intuition that measure phrases are ‘predicates of gaps’ (McConnell-Ginet 1973, Schwarzschild (2005)) very seriously.

A differential degree is not an interval in the middle of a scale, as in (75), but rather the gap between two intervals in a scale, as in (76):

\[(76)\]

\[\text{HEIGHT SCALE}\]

\[\text{\texttt{tall}(Floyd)}\]

\[\text{\texttt{tall}(Clyde)}\]

\[\text{\texttt{tall}(Floyd) ∪ −\texttt{tall}(Clyde)}\]

So why do MPs insist on measuring from somewhere other than the bottom of a scale (or else, on measuring on a derived scale)? They don’t. They just require two (nonzero) intervals to measure the distance between.

This is broadly compatible the Kennedy (2001) conception, since all degrees would still involve intervals. Differential degrees would involve two intervals or—another way of thinking about it—an empty gap interval on a scale.

Sortal typology of degrees:

- positive degree: (usually finite) interval on a scale starting at the bottom
- negative degree: (often non-finite) interval on a scale extending to the top
- differential degree: a gap in a scale between two intervals; the union of a positive and a negative degree

Measure phrases can thus be predicates of a distinct sort of degree, as Schwarzschild (2005) would have it—differential degrees. Thus makes a sortal distinction without resort to a point-based notion of degrees.

5.2 Differential Comparatives

(77) Clyde is ten centimeters taller than Floyd.

A relatively standard conception of what this means would interpret this as (78):

\[(78)\]

\[\text{\texttt{ten-centimeters}}(\texttt{tall}(Clyde) − \texttt{tall}(Floyd))\]

On the approach suggested here, it would instead be as in (79):

\[(79)\]

\[\text{\texttt{ten-centimeters}}(\texttt{tall}(Floyd) ∪ −\texttt{tall}(Clyde))\]

Assuming a syntax in which there are no additional degree heads beyond the comparative morpheme and a Kennedy (1997)-style adjective semantics:

\[\text{\texttt{ten-centimeters}}(\texttt{tall}(Floyd) ∪ −\texttt{tall}(Clyde))\]

17 This also preserves the idea that measure phrases measure something ‘mass-like’, with non-atomic part structure (Schwarzschild, 2005, 2006).
Comparative morphology values case in MPs, but it’s perfectly happy not to in their absence.

Non-comparative adjectives that are ‘inherently’ comparative—overdue, late, early—just lexicalized a comparative morpheme. Their denotation provides differential degrees directly:

\[
\begin{align*}
\text{tall} & = \lambda x . \text{tall}(x) \\
\text{more} & = \lambda a_{(e,d)} \lambda d \lambda m_{(d,t)} \lambda x . m(d \cup -a(x)) \\
\text{than Floyd} & = \text{tall}(\text{Floyd}) \\
\text{six feet} & = \lambda d . \text{six-feet}(d) \\
\text{six feet more tall than Floyd} & = \lambda x . \text{six-feet}(\text{tall}(\text{Floyd}) \cup -\text{tall}(x))
\end{align*}
\]

Consequently, an MP is possible here, yielding the expected interpretation:

\[
\begin{align*}
\text{Clyde is twenty minutes late.} \\
\text{twenty-minutes(\text{late}(\text{Clyde}))}
\end{align*}
\]

5.3 By Phrases

By MPs can have exactly the same denotation as the corresponding bare MPs:

\[
\begin{align*}
\text{Clyde is taller than Floyd by ten centimeters.} \\
\text{Clyde is taller than Floyd by ten centimeters (87) }
\end{align*}
\]

5.4 Non-Comparative Adjectives

What to make of non-comparative adjectives?

In cases where the measure phrase is not possible—as is the case for many measure phrases and in many languages—nothing special needs to be said, beyond some form of some typical assumptions (for this kind of syntax).
DegP\( e, t \)  
\[ \text{DegP}_e^P \]

\begin{align*}
\text{DegP}_e^P = & \text{Deg}_{e, t}^P \\
\text{Deg}_{e, t}^P = & \text{Deg}_{e, t} \\
\text{Deg}_{e, t} = & \text{Deg}_{e, t} \\
\text{AP}_{e, d} = & \text{AP}_{e, d} \\
\end{align*}

(89) \[ \text{[POS]} = \lambda a_{e, d} \lambda x . a(x) \geq d \]

MPs are impossible here for straightforward type-theoretic reasons. Even apart from that, heavy\( (x) \) could not be measured, since it isn’t a differential degree.

How to account for the marked cases where an MP is possible with a positive adjective? Something like the MP-licensing head of Svenonius & Kennedy [2006]:

(90) \[ \text{DegP}_e^P \]

A syntactic assumption: MEAS requires that its specifier be filled by an MP. (Possibly better understanding: By something in need of case licensing).

(91) \[ \text{[MEAS]} = \lambda a_{e, d} \lambda m_{d, t} \lambda x . m\left(-a(x) \cup \text{MIN}(\text{SCALE}(a(x)))\right) \]

(92) \[ \text{[six feet MEAS tall ] } = \text{ six-feet } \left(-\text{tall}(x) \cup \text{MIN}(\text{SCALE}(\text{tall}(x)))\right) \]

This ‘builds’ a differential degree roughly as in (93):

So why six feet tall but not *tall by six feet?:

- POS tall by six feet is uninterpretable for both type-theoretic and sortal reasons
- MEAS tall by six feet is syntactically ill-formed (because MEAS requires an MP in its specifier)

Given the type-theoretic aspect of this story and its syntactic assumptions, it essentially embodies Svenonius & Kennedy [2006]. The important additional work that the sortal distinction is doing at this point is:

- it provides an understanding of what is odd about *tall by six feet independent of these syntactic and type-theoretic assumptions, since it requires that something special be done to render tall compatible with MP modification
- it requires the additional operation that renders tall compatible with MP modification to be fairly odd—not outlandishly so, but enough to reflect its markedness

The little glob below should actually have no (non-infinitesimal) width.
5.5 Negative Adjectives and MPs

(94)  
   a. six feet tall
   b. *six feet short

Let’s suppose short could combine with MEAS:

(95)  
\[
\begin{align*}
\text{\{six feet MEAS short\}} \\
= \text{\{MEAS\}\{short\}\{six feet\}} \\
= \text{six-feet (short}(x) \cup \text{MIN(Scale(short}(x))))
\end{align*}
\]

As before, six feet can’t measure on the scale of shortness inherently, because its ‘yardstick’ is positive. But even if it could, (95) would be odd.

If the scale of shortness has its ordering reversed, there would be no ‘bottom’ to this scale (one can be arbitrarily non-tall) and (95) would give rise to failure of presupposition because \text{MIN(Scale(short}(x))) would be undefined.

But even if we take the bottom of the scale of shortness to be defined and the same as the bottom of the scale of tallness, (95) would not be defined:

(96)  
\[
\begin{align*}
\text{HEIGHT SCALE} \\
\text{tall}(Floyd) \\
\text{short}(Floyd) \\
\text{−short}(Floyd) \cup \text{MIN(Scale(short}(Floyd)))
\end{align*}
\]

As this representation reflects, this fails to build a differential degree. There is no gap between two intervals for the MP to measure. (In fact, \text{−short}(Floyd) \cup \text{MIN(Scale(short}(Floyd))) would emerge as identical to \text{tall}(Floyd).)

5.6 Cross-Polar Anomaly

(97)  
   a. ?Floyd is shorter than Clyde is tall.
   b. ?Clyde is taller than Floyd is short.

It will be easier here (given the denotation provided above) to consider instead (98):

(98)  
?Clyde is ten centimeters taller than Floyd is short.

Predicted meaning:

(99)  
\[
\text{ten-centimeters(short}(Floyd) \cup \text{−tall}(Clyde))
\]

As for Kennedy [2001], this would be undefined because \text{tall}(Floyd) and \text{short}(Floyd) are on distinct scales.

Even setting this aside, though, (99) would be undefined. If (100a) were the case, (99) would be equivalent to (100b):

(100)  
   a. \text{−tall}(Clyde) = \text{short}(Clyde)
   b. \text{ten-centimeters(short}(Floyd) \cup \text{short}(Clyde))

(101)  
\[
\begin{align*}
\text{HEIGHT SCALE} \\
\text{short}(Floyd) \\
\text{short(Clyde)} \\
\text{short}(Floyd) \cup \text{short}(Clyde)
\end{align*}
\]

Once again, \text{ten-centimeters} would not receive a differential degree to apply to. There is no ‘gap’ in \text{short}(Floyd) \cup \text{short}(Clyde), as (101) reflects. It would actually be identical to \text{short}(Floyd).

\[\text{20 Or in any case short}(Floyd) \cup \text{−tall}(Clyde) would not represent any degree, since it would be on no single scale.\]
5.7 Differences From Kennedy Ontology

In general, the advantages of Kennedy’s account carry over.

But in a certain sense, this may actually improve on that story:

- in the original story, it is actually important that *short* and *tall* measure on *distinct* scales, identical apart from opposite orderings
- it is also important that the ‘yardstick’ used by MPs be positive, so on the same scale as *tall* but not *short*
- without distinct scales, Kennedy still predicts necessary falsehood, but not directly ill-formedness
- with differential degrees, though, the relevant sentences emerge as ill-formed even if *short* and *tall* are on the same scale.

6 Some Elaborations

6.1 Any Headway Toward Slightly?

Possibly.

The problem again: *slightly* and *somewhat* often seem to want to do differential measurement, as in comparatives, inherently-comparative APs, PPs, and VPs. But at other times, they seem happy not to:

(102) a. Floyd is \{slightly\} taller than Clyde.
    b. Floyd is taller than Clyde by several feet.

(103) a. This box is \{slightly\} too wide.
    b. This box is too wide by a few centimeters.

(104) a. *Floyd is \{slightly\} tall.
    b. *Floyd is tall by several feet.

(105) a. *This box is \{slightly\} \{somewhat\} \{ugly\} \{wide\}.
    b. *This box is wide by a few centimeters.

(106) a. Floyd is \{slightly\} \{somewhat\} \{ugly\} \{insane\}.
    b. This law is \{slightly\} \{somewhat\} \{ridiculous\} \{stupid\}.

The crucial element here may be that *slightly* always measures relative to a standard, not to the bottom of a scale. This is differential measurement. What’s special about *ugly*, *insane*, etc. is that their standard value defaults to the bottom of the scale (Kennedy & McNally 2005).

One way to spell this intuition out and cope with *ugly*: A distinct degree word, TOO, that measures relative to a standard and yields differential degrees.

(107) \[ \text{TOO} \] = \[ \lambda x \cdot m(d, t) \lambda x . m(d, s \cup -a(x)) \]

This means roughly ‘more than the contextually-provided standard’.

(108) \[ \text{slightly} \] = \[ \lambda d . \text{small}(d) \]
\[ \text{slightly \ TOO ugly} \] = \[ \lambda x . \text{small}(d, s \cup -\text{ugly}(x)) \]

This would also allow *slightly tall* only on the ‘too tall’ reading:

(109) \[ \text{slightly \ TOO tall} \] = \[ \lambda x . \text{small}(d, s \cup -\text{tall}(x)) \]

If TOO requires its specifier to be filled, *tall by six feet* should still be ill-formed—as would *ugly by a little bit*.

Why a null head rather than a type-shift or coercion operation?:

- too complicated to be a type shift
- plausibly a coercion operation; there’d then be coercion in *slightly ugly*, though—not inconceivable, since coercion might be cheaper in some cases than in others, for some yet-to-be-made-explicit but imaginable pragmatic reasons
- either coercion or type-shift would require explanation of why this won’t rescue *tall by six feet*
- methodological preference
6.2 How About a Little?

A little and a bit are idiosyncratic:

\[(110)\]

\[
\begin{align*}
&\{ \text{a little} \} \text{ ugly} \\
&\{ \text{a bit} \} \text{ ugly} \\
&\{ \text{a small amount} \} \text{ ugly} \\
&\{ \text{not a lot} \} \text{ ugly} \\
&\{ \text{a little bit} \} \text{ ugly} \\
&\{ \text{a tiny bit} \} \text{ ugly} \\
&\{ \text{*a small bit} \} \text{ ugly} \\
&\{ \text{*an extremely little bit} \} \text{ ugly}
\end{align*}
\]

What's special about them: they're marked lexically as case-theoretically independent (come with case features valued lexically, as Larson 1985 suggests for DP adverbials).

If TOO doesn't assign case to its specifier, it would be compatible with a little and a bit just as it is with slightly and somewhat, even though it is incompatible with (ordinary) bare MPs:

\[(111)\]

\[
\begin{align*}
&\{ \text{a little} \} \text{ TOO tall} \\
&\{ \text{slightly} \} \text{ TOO tall} \\
&\{ \text{six feet} \} \text{ TOO tall} \\
&\{ \text{*six feet} \} \text{ TOO tall} \\
&\{ \text{*a small amount} \} \text{ TOO tall}
\end{align*}
\]

Case problems rule out (111c); the empty specifier rules out (111d).

Of course, a little and a bit will still be expected to be good in comparatives and other differential environments.

7 Wild Cross-Categorial Speculation, Briefly

7.1 In VP

Needs to be worked out, but the analytical direction is:

- verbs like delay and exceed license by MPs because they are inherently comparative, like overdue and late; they directly provide differential degrees

- degree achievements (cool, grow, etc.) license by MPs because they are structurally comparative-like (Kennedy & Levin to appear)

- weigh by six pounds is analogous to tall by six feet; weigh in not inherently comparative, and it gets no help from the comparative-like syntactic structures involved in degree achievements

7.2 In PP

These are all good with bare MPs, as (111) reflects, and with by MPs as well:

\[(112)\]

\[
\begin{align*}
&\{ \text{past} \} \text{ the intersection.} \\
&\{ \text{in front of} \} \text{ the sofa.} \\
&\{ \text{after} \} \text{ class.} \\
&\{ \text{above} \} \text{ the farm.}
\end{align*}
\]

All in a particular sense sense inherently comparative, much as early and late are. All involve measurement that can be construed as involving the middle of a scale (rather than an interval that includes an endpoint)—that is, as involving a differential degree:

- In the case of past, beyond, in front of, behind, above, and below, the scale seems to start at the speaker (point-of-view 'pivot').

- The scale for after and before seems to either be open on both ends.

PPs that don't have this property tend not to allow MPs (sentences modeled after Zwarts & Winter 2000 and Winter 2005):

\[(113)\]

\[
\begin{align*}
&\text{*The gas station is two blocks around the intersection.} \\
&\text{*The coffee table is two feet on the sofa.}
\end{align*}
\]
c. *The meeting is 15 minutes at six.
d. *The bird is 15 feet near the farm.

In these cases, either there is no obvious single-dimensional scale or the scale seems to start at the reference point provided by the object.

8 Final Remarks

Summary:
- MPs tend to occur in differential structures, not only across language, but also across categories
- even in English, as by MPs reflect, positive adjectives that take bare MPs are unusual
- to model this, a sortal distinction should be made between ordinary and differential degrees—without sacrificing the advantages of interval-based degree semantics
- MPs can be understood as predicates of differential degrees inherently
- differential degrees can be construed as gaps on a scale
- construing differential degrees this way allows degrees in general to be intervals
- it avoids the otherwise mysterious situation in which MPs prefer to measure on derived scales or from non-zero points on a scale

Some remaining questions:
- how does this carry over to PP and VP (beyond speculation)?
- potential connections to nominal measurement?
- further scale structure questions:
  - differential degrees can be built out of open or closed intervals
  - what lexical semantic distinctions might this give rise to?
  - might this help in accounting for e.g. telicity facts?

References


morzycki@msu.edu
http://www.msu.edu/~morzycki
Dept. of Linguistics and Languages
Michigan State University
East Lansing, MI 48824
USA


