Schwarzschild (2005), "Measure Phrases as Modifiers of Adjectives"

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December 9, 2019

1 Introduction

Usual assumption about measure phrases: they're arguments of gradable adjectives.

- Gradable adjectives have degree arguments.[1]
- Measure phrases directly denote degrees.
- Thus, measure phrases can saturate the degree argument of a gradable adjective.

(1) a. $[\![\textit{180 centimeters}]\!] = \iota d.\, d$ corresponds to 180 centimeters on the HEIGHT scale
b. $[\![\textit{tall}]\!] = \lambda d \lambda x.\textbf{tall}(x, d)$
c. $[\![\textit{180 centimeters tall}]\!] = \lambda x.\textbf{tall}(x, [\![\textit{180 centimeters}]\!])$

But, there's some reasons to think this is wrong. First, the position to the left of a predicate is usually the position of a modifier, not an argument. The position to the right of a predicate is where arguments usually go, and measure phrases cannot go in this position.

(2) a. extremely tall
b. strangely tall

(3) *tall (of) 180 centimeters

At least in English, stress assignment also usually seems to track modifier versus argument. Predicates are less stressed than arguments in neutral contexts. (Stress marked with an acute accent.)

(4) a. five feet táll
b. ??fíve feet tall

[1] I use a semantics for gradable adjectives here that treats them as relations between individuals and degrees.

(5) a. John kicked the báll.
b. ??John kícked the ball.

And, if we nominalize the degree term, why aren't the following possible, if MPs and nominalized degree terms are both simply degree denoting?

(6) a. *John's height tall.
b. *Mary is John's age old.

Finally, there's a great deal of lexical idiosyncrasy about whether a gradable adjective can combine with a measure phrase in the first place. For instance, some adjectives permit a measure phrase while used in the comparative, but not in the positive.

(7) a. five dollars more expensive
b. *five dollars expensive

Proposal:

- Measure phrases are not directly degree denoting.
- Instead, they measure gaps/intervals, sets of degrees.
- This is based partially on the fact that MPs appear in the comparative.
- Need a way of relating adjectives to an interval.

2 Distribution of measure phrases in adjective phrases

To press on the issue a bit more, there are loads of adjectives who can't directly take measure phrases in the positive, but can in the comparative.

(8) a. *6 lbs heavy/light
b. *30°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. *$10 rich/poor
i. *20 IQ points intelligent/stupid
j. *2 percentage points likely
k. *2°acute
l. *it takes 2 days long
m. *200 pounds fat/thin
n. *The winds are 25 mph strong.
o. *30 miles close/far/near
p. *600 watts powerful5
q. *20 points popular
r. *20pts well/bad on the exam

Not always the same adjectives cross-linguistically.

(9) a. pesante quasi due tonnellate (Italian)
heavy almost 2 tons
'weighs almost two tons'
b. is 2 boeken rijk (Dutch)
is 2 books rich
'owns two books'
c. Het dorp is twee kilometer ver (Dutch)
the village is 2 km far
'the village is two kilometers away'

(10) German
a. 35°heiss, '35°hot'
b. -10°kalt, '-10°cold'
c. 100 Tonnen schwer, '100 tons heavy'
d. 130 Meter gross, '130 meters big'
e. 60 Studenkilometer schnell, '60 kph fast'

x Not all languages permit direct modification by a measure phrase as well. But, Schwarzschild hypothesizes the following:

(11) If a language has direct measure phrases, it will have indirect measure phrases, but not vice versa.

3 Measure phrases as predicates of gaps

Typical structure for a comparative:

(12) $[\![\textit{John is taller than Mary}]\!] = \exists d \exists d' [\textbf{tall}(j,d) \wedge \textbf{tall}(m,d') \wedge d > d']$

But under what conditions is a comparative true? Comparatives are true just in case there is a gap between the measures of two individuals. Measure phrase can measure that gap. (**gap** measures the gap that spans from a smaller degree to a higher degree.)

(13) $[\![\textit{John is two centimeters taller than Mary}]\!]$
$= \exists d \exists d' [\textbf{tall}(j,d) \wedge \textbf{tall}(m,d') \wedge d > d' \wedge \textbf{2-centimeters}(\textbf{gap}(d',d))]$

Basic intuition: we use measure phrases in two ways.

- The first is to name degrees, specific points an interval.
- Second is to measure distance between two points on an interval.
- Similar to how we use the lines on a measuring stick.

What does a measure phrase do?

- A predicate like *centimeter* is true of certain sets of points.
- Pluralization says that we have a set of points which can be partitioned into at least two sets of points, each a centimeter long.
- This gives us a nice theory of what plurals do in measure phrases.
- Also, beginnings of a theory of e.g. *several centimeters*. This is true just in case there are several sets of points in the partition.

4 Measure phrases in the positive construction

There's two possibilities for how to interpret a relation between individuals and degrees. Not always an innocent choice.

(14) a. $\textbf{tall}(x,d)$ "x's height is exactly d"
b. $\textbf{tall}(x,d)$ "x's height exceeds d"

Schwarzschild proposes taking the "exceeds" option. This requires some minimal modification to the semantics of the comparative, in order to make sure the comparative looks at the maximal degree of height.[2]

(15) $[\![\textit{John is taller than Mary}]\!] = \exists d \exists d' \left[\begin{array}{ll} d = \textbf{max}(\{d_j : \textbf{tall}(j,d_j)\}) & \wedge \\ d' = \textbf{max}(\{d_m : \textbf{tall}(m,d_m)\}) & \wedge \\ d > d' & \end{array}\right]$

We can take **height** to be a shorthand for taking the upper-limit of tallness for some individual.

(16) $\textbf{height}(x) \stackrel{\text{def}}{=} \textbf{max}(\{d_x : \textbf{tall}(x,d_x)\})$

Thus, a comparative with a MP has the meaning

(17) $[\![\textit{John is two centimeters taller than Mary}]\!] = \textbf{2-centimeters}\left(\textbf{gap}\left(\begin{array}{l}\textbf{height(m)},\\ \textbf{height(j)}\end{array}\right)\right)$

And, we can take nominalized degree terms as simply being names for degrees.

(18) a. $[\![\textit{height}]\!] = \lambda x.\textbf{height}(x)$
b. $[\![\textit{John's height}]\!] = \textbf{height}([\![\textit{John}]\!])$

[2] Schwarzschild introduces a predicate **UpLim**, which takes a property of degrees and finds the highest degree in that set. I've changed this to **max**.

5 Modification by measure phrases

Adjectival and adverbial modifiers are (often) taken to be predicates of individuals or events (Davidson 1967, Parsons 1990, Larson 1998).

(19) a. John quickly left.
b. $[\![quickly]\!] = \lambda e_v.\textbf{quick}(e)$
c. $\exists e_v[\textbf{leave}(e) \wedge \textbf{Agent}(e, \textbf{j}) \wedge \textbf{quick}(e)]$

(20) a. Olga is a beautiful dancer.
b. $\text{GEN}\, e_v[\textbf{dance}(e, \textbf{o}) \rightarrow \textbf{beautiful}(e)]$
"Generally, in dancing events, Olga dances beautifully."[3]

This won't work for deadjectival nominalizations like *John's height*: they're degree names, not predicates (e.g., type d, not $\langle d, t\rangle$).

How to combine measure phrase with adjective?

- We run into a type problem.
- Measure phrase is a predicate of a gap, e.g. a set of degrees.
- Moreover, it is an idiosyncratic (lexical) fact whether a predicate can combine with a measure phrase or not.

(21) **Homonym Rule** (a typeshift from degrees to intervals)
If adjective 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 $\lambda I \lambda x.I = \{d : A'(x, d)\}$

This rule can be lexically specified to apply to specific adjectives in a language (such as *tall*, *wide*, *deep*, *thick*, *old*, *long*, *high*).

Homonym Rule applies to typeshift the adjective, and then the measure phrase can be interpreted intersectively with the new adjective meaning.

(22) $[\![\textit{Mary is five feet tall}]\!] = \exists I[\textbf{tall}(m, I) \wedge \textbf{5-feet}(I)]$

Aside: why don't deadjectival nominalizations directly saturate degree argument of adjective?

- Schwarzschild makes an analogy with tense arguments.
- No lexical material can bind these arguments (e.g., *yesterday*).
- Instead, bound by functional operators (e.g., tense/aspect morphology).
- In the same way, degree arguments must be bound by functional degree morphology, like comparative or superlative markers.

Big point: as a rule, gradable adjectives do not have the right type to be modified by a MP. Something special (and language specific) needs to happen to license a measure phrase.

6 Antonyms

What goes wrong with antonyms like **5 feet short*? First, look at the kinds of intervals (sets of degrees) created by the Homonym Rule.

- These are upper-bounded sets, set by the height of John/the Eiffel Tower.
- These are lower-bounded sets, set by zero height.

(23) a. $\{d :$ John's height exceeds $d\}$
b. $\{d :$ The height of the Eiffel Tower exceeds $d\}$

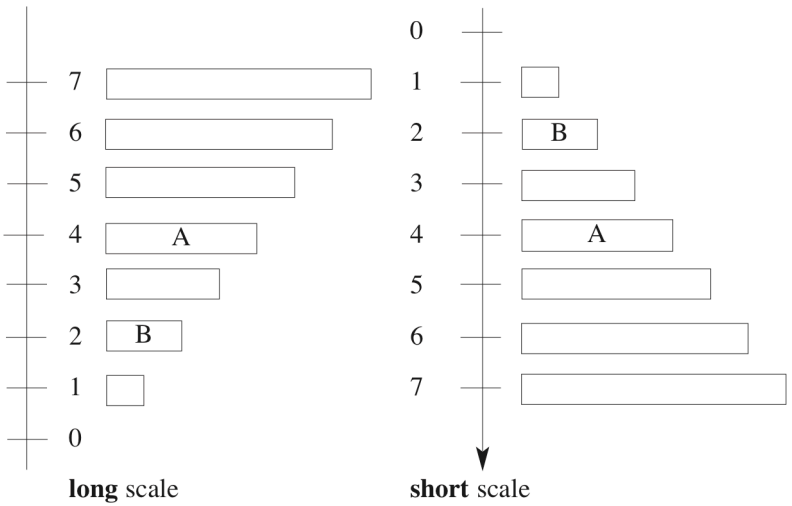
But, consider the scale for *short*.

- For this, we take a slightly different set of points.
- Maximum degree is the height of John.
- If the Eiffel Tower is greater than John on the *tall* ordering, then John is greater than the Eiffel Tower on the short ordering.
- To be short is to have a degree of shortness that exceeds all the things that you are shorter than.
- There are infinitely many things one is shorter than.

(24) $\{d :$ John's height $\text{exceeds}_{\text{short}}\ d\}$

Visually, it's something like this:

[3] This logical form is slightly modified from what Schwarzschild cites from Larson (1998).



What goes wrong with measure phrases?

- No lower bound to the scale.
- Infinitely many points which someone can be short of.
- Because there is no lower bound, a measure phrase of the form *n meters short* can never be true of that interval.

References

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