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Variation in the Expression of Comparison
Implications for the Semantics of Comparatives and Gradable Predicates

1   What is a comparative construction?

The first issue we need to deal with is the definition of a 'comparative construction'. Here is Stassen's (1985, p. 24) definition:

(1)   A construction in natural language counts as a comparative construction if that construction has the semantic function of assigning a graded (i.e. non-identical) position on a predicative scale to two (possibly complex) objects.

This is a good starting point, but even if we just focus on English for the moment, it classifies all of (2a-d) as comparatives.

(2)   a.   Kim is taller than Lee.
       b.   Kim's height exceeds Lee's height.
       c.   {Compared to, With respect to} Lee, Kim is tall.
       d.   Comparatively, Kim is tall and Lee is not/is short.

These sentences all satisfy the definition in (1), but are they all 'comparative constructions'? There are some important empirical differences between them:

1. In examples involving 'absolute' gradable adjectives (Kennedy and McNally 2005; cf. Rotstein and Winter's (2004) 'total/partial' adjectives), only (3a-b) can be used to express felicitous comparisons independently of whether the truth conditions for the positive form are satisfied:

(3)   CONTEXT: Two wet dogs, one of which is wetter than the other.
       a.   Fido is wetter than Rover.
       b.   Fido's wetness exceeds Rover's wetness.
       c. ??{Compared to, With respect to} Rover, Fido is wet.
       d. ??{Comparatively, With respect to Fido and Rover}, Fido is wet and Rover is not/is dry.

(4)   CONTEXT: Two wet towels, one of which is drier than the other.
       a.   This towel is dryer than that one.
       b. ?The dryness of this towel exceeds the dryness of that one.
       c. ??{Compared to, with respect to} that towel, this one is dry.
       d. ??Comparatively, this one is dry and that one is not/is wet.

2. Only (5a-b) are felicitious in contexts involving 'crisp judgments':

(5)   CONTEXT: Two essays, one of which is a few words longer than the other.
       a.   This essay is longer than that one.
       b.   The length of this essay exceeds the length of that one.
       c. ??{Compared to, With respect to} that essay, this one is long.
       d. ??Comparatively, this essay is long and that one is not.

3. Only (6a-b) support 'differential measurements':

(6) a. Kim is 10 cm taller than Lee.
     b. Kim's height exceeds Lee's height by 10 cm.
     c. ??{Compared to, With respect to} Lee, Kim is 10cm tall.
     d. ??Comparatively, Kim is 10 cm tall and Lee is not.

As we saw in yesterday's talk, these differences reflect the underlying 'mode of comparison': whether it is EXPLICIT or IMPLICIT, in the sense defined below:

(7) a. *Implicit Comparison*
         Establish an ordering between objects x and y with respect to gradable property g using the positive form by manipulating the context or delineation function in such a way that the positive form true of x and false of y.
     b. *Explicit Comparison*
         Establish an ordering between objects x and y with respect to gradable property g using morphology whose conventional meaning has the consequence that the degree to which x is g exceeds the degree to which y is g.

(1) does not distinguish between the two modes, but the tests outlined above do, and as we look at the typological data, we need to be sensitive to this distinction. In particular, we would like to know whether all languages have (non-periphrastic versions of) both modes of comparison, or whether some languages have only implicit comparison.

I won't be able to answer this question today, because I haven't done all the fieldwork yet. What I will do instead is provide a general overview of the typological data as it currently stands, then evaluate several differnet approaches to the semantics of gradable adjectives and comparatives with respect to the data.

2 The expression of comparison in the world's languages

Comparatives have the following semantic constituents (the labels are meant to be descriptive), illustrated with an example from English.

(8)	TARGET OF COMPARISON	GRADABLE PREDICATE	COMPARATIVE MORPHEME	STANDARD MARKER	STANDARD OF COMPARISON
	Kim (is)	tall	-er	than	Lee.

The way that the various semantic constituents illustrated in (8) are expressed syntactically varies quite a bit from language to language. In the next few sections, I provide illustrations of the basic strategies for expressing comparison identifed by Stassen (1985).

As we will see, not all languages have comparatives that (overtly) manifest all of the constituents in (8). In particular, for each comparative type (except perhaps for the 'exceed comparative'), the comparative morpheme is optional. To illustrate this, I have enclosed it in a $\boxed{\text{box}}$ when it is present.

2.1 Particle Comparatives

The standard is introduced by a pre-/post-positional morpheme, which may or may not also have an independent semantic life as a (typically) directional morpheme. There are several different varietes of this type.

2.1.1 Separative Comparatives

The standard marker is a morpheme with a meaning roughly equivalent to 'from'. (*Languages*: Amharic, Classical Arabic, Carib, Guarani, Biblical Hebrew, Hindi, Japanese, Korean, Manchu, Mundari, Quechua, Tibetan, and Turkish.)

(9) Sadom-ete hati   mananga-i
     horse-from elephant big-pres-3sg
     'The elephant is bigger than the horse.'   MUNDARI

(10) Nihongo-wa doitsgo yori muzukashi
      Japnese-TOP German from difficult
      'Japanese is more difficult than German.'   JAPANESE

(11) Laysat al-nisa   ʾadcafa   min al-rijali
      not   the-women weak.COMP from the-men
      'Women are not weaker than men.'   CLASSICAL ARABIC

2.1.2 Allative Comparatives

The standard marker is a morpheme that typically introduces goal phrases (like 'to' or 'for'). (*Languages*: Breton, Jacaltec, Kanuri, Maasai, Nuer, Tarascan.)

(12) Sapuk ol-kondi to l-kibulekeny
      is-big the-deer to the-waterbuck
      'The deer is bigger than the waterbuck.'   MAASAI

(13) Jazo bras-ox wid-on
      he   big-prt for-me
      'He is bigger than me.'   BRETON

(14) Ka' icham hin s-sataj   naj Pel
      more old   I   him-before he Pel
      'I am older than Pel.'   JACALTEC

2.1.3 Locative Comparatives

The standard marker is a morpheme with a meaning along the lines of 'on'. (*Languages*: Cebuano, Chuckchee, Mandinka, Miwok, Navajo, Salinan, Tamil.)

(15) Gamga-qla'ul-ik qetvu-ci-um
      all-men-on   strong-more-1sg
      'I am stronger than all men.'   CHUCKCHEE

(16) Ragas-mo in   luwa ti-hek
      surely-you more man on-me
      'You are certainly more of a man than me.'   SALINAN

(17) A ka gya ni ma
      he is big me on
      'He is bigger than me.'   MANDINKA

2.1.4 Than Comparatives

The standard of comparison is marked by a construction-specific morpheme (the 'comparative particle'). (*Languages*: Albanian, Basque, English, Finnish, Hungarian, Ilocano, Javanese, Malagasy, Sranan, Toba Batak, most European languages.)

(18)   Kim is tall⟨er⟩than Lee.   ENGLISH

(19)   Istvan magasa-⟨bb⟩mint Peter
         I.   tall-prt   than Peter
         'Istvan is taller than Peter.'   HUNGARIAN

(20)   Enak   daging karo iwak
         is-good meat   than fish
         'Meat is better than fish.'   JAVANESE

(21)   Lehibe noho ny zana-ny Rabe
         tall   than the son-his R.
         'Rabe is taller than his son.'   MALAGASY

2.2   Exceed Comparatives

The standard of comparison is the direct object of a special transitive verb, which typically has a meaning along the lines of 'exceed' or 'surpass'. (*Languages*: Cambodian, Fulani, Hausa, Igbo, Mandarin Chinese, Vietnamese, Swahili, Thai, Wolof, Yoruba.)

The verb and gradable predicate can combine in a serial-verb type of construction. (Though I should say that I am somewhat skeptical as to whether these should be classified in this way, or whether the 'exceed verbs' might be better treated as particles of some type.)

(22)   To bi   ni gau.
         He exceed you tall
         'He is taller than you.'   MANDARIN

(23)   O tobi ju   u
         he big exceed him
         'He is bigger than him.'   YORUBA

(24)   Vang qui   hon   bac
         gold valuable exceed silver
         'Gold is more valuable than silver.'   VIETNAMESE

Or the exceed verb can be (part of) an adjunct:

(25)   Mti huu ni mrefu ku-shinda ule
         tree this is big   inf-exceed that
         'This tree is taller than that tree.'   SWAHILI

Or the predicate can be an adjunct(?):

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(26)   Doki ya-fi   rago girma
        horse it-exceed goat bigness
        'A horse is bigger than a goat.'   HAUSA

2.3   Conjoined Comparatives

Comparison is effected by means of an adversative coordination of two clauses that contrast the target and standard of comparison along some dimension.

There are two options for expressing this kind of comparison. The first uses antonymous predicates. (*Languages*: Dakota, Miskito, Maori, Cayapo, Mangarayi, Samoan, Sika.)

(27)   Ua loa lenei va'a, ua puupuu lena
        is long this boat, is short   that
        'This boat is longer than that boat.'   SAMOAN

(28)   Mastingcala king waste, tka singthela   king sice
        rabbit   the good, but rattlesnake the bad
        'The rabbit is better than the rattlesnake.'   DAKOTA

(29)   Yan $\boxed{\text{kau}}$ tukta, man almuk.
        I   more young, he   old
        I am younger than him.   MISKITO

The second uses negation. (*Other languages*: Hixkaryana, Menomini, Mixtec, Shipibo, Yavapai, Motu.)

(30)   kaw-ohra naha Waraka, kaw naha Kaywerye
        tall-not   he-is W.,   tall he-is K.
        'Kaywerye is taller than Waraka.'   HIXKARYANA

(31) $\boxed{\text{apeqsek}}$ tata'hkesew, nenah teh kan
        more   he-is-strong, I   and not.'
        'He is stronger than me.'   MENOMINI

(32)   Ina na namo $\boxed{\text{herea}}$ una na dia namo.
        this is good more that is not good
        'This is better than that.'   MOTU

These look like strong candidates for implicit comparison languages. In the case of Samoan, we have some evidence that the function of the construction is one of comparison, rather than 'parallel positive predications'. The following quote from (Marsack 1975, p. 66) is instructive:

"Even in the case of giant vessels like the *Queen Mary* and the *Aquitania* this construction would be used. To indicate that the 85,000 ton *Queen Mary* is bigger than the 45,000 ton *Aquitania*, a Samoan of the old school would say [(33)]."

(33)   Ua tele le   Queen Mary, ua la'itiiti le   Aquitania.
        is   big the Queen Mary, is small   the Aquitania
        'The *Queen Mary* is bigger than the *Aquitania.*'   SAMOAN

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This looks like independence from the positive form (the *Acquitania* is clearly not small), but it is not an example of a 'crisp judgment', so we can't be completely sure that this isn't just a highly contextualized use of the positive form (a 'small planet' use).

The fact that many (possibly all?) of these languages have more familiar looking 'secondary options' makes me suspicious about the conjoined forms:

(34) Hoksila king atku-ku   isam hangska.
     boy   the father-his on   tall
     'The boy is taller than his father.'   DAKOTA

(35) Ua   sili   tele   le mauga   i' le fale.
     PRES exceed very.much the mountain at the house
     'The mountain is higher than the house.'   SAMOAN

(36) Au gahar toi   wucé   aung.
     you big   excel brother your
     'You are bigger than your brother.'   SIKA

In Samoan, the grammars describe forms like (35) as late introductions due to contact effects, which leaves open the possibility that the conjoined form was at one time the only comparative. We need to take a closer look at these constructions, checking in particular for their status with respect to crisp judgments and measure phrases.

2.4   Other distinctions

2.4.1   'Expletive' negation

Negation also appears in some subordinate comparative clauses. We get it in French with a finite verb and in Italian with *che*+subjunctive comparatives:

(37) J'ai   besoin de plus de sel que je n'ai   besoin de poivre.
     I-have need   of more of salt that I not-have need   of pepper.
     'I need more salt than I need pepper.'   FRENCH
(38) a. Gianni è più   grande che   non pensassi.
         Gianni is more tall   that not think-past.subj.1sg
         'Gianni is taller than I thought.'
     b. *Gianni è più   grande di quello che   non pensassi.
         Giannni is more tall   of which that not think-past.subj.1sg
     c. Gianni è più   grande di quello che   pensavo.
         Gianni is more tall   of which that think-past.ind.1sg
         'Gianni is taller than I thought.'   ITALIAN

These are usually classified as cases of expletive negation, on the basis of a comparison with 'contentful' negation in English comparative clauses, which leads to unacceptability (von Stechow 1984a; Rullmann 1995; Beck, Oda, and Sugisaki 2004):

(39) a. *I need more salt than I don't need pepper.
     b. *John is taller than I didn't think.

It might be worth keeping an open mind about this, however.

2.4.2 Fixed-case vs. Derived-case Systems

A distinction that cross-cuts the categories listed above concerns the case morphology on the standard NP: is it the same in every context, or does it vary, depending on the target of comparison? Latin has both options (so does Russian):

(40)   a.   Cato Ciceron-e   eloquentior   est.
            Cato Cicero-ABL more-eloquent is
            'Cato is more eloquent than Cicero.'   LATIN FIXED CASE
       b.   Cato est eloquentior   quam Cicero.
            Cato is   more-eloquent than   Cicero-NOM
            'Cato is more eloquent than Cicero.'   LATIN DERIVED CASE

Yesterday I suggested that this correlates with the individual (= fixed case) vs. degree (= derived case) distinction. Hopefully, a close look at what is going on here will help give a handle on the origin of this distinction (syntactic, morphological, lexical).

2.4.3 The complexity of the standard constituent

Another issue that is also relevant to the degree/individual distinction is the range of syntactic/semantic types that the standard constituent may take on. English allows quite a variety, as illustrated by (41).

(41)   a.   Kim is taller than Lee.
       b.   Kim is taller than Lee is.
       c.   Kim is taller than you said (that Bill reported ...) that Lee is.
       d.   Kim is taller than this hole is deep.
       e.   Kim is taller than 2 meters.

We saw yesterday however that Japanese has only allow nominal standards (Beck et al. 2004); Mandarin is probably the same (Fu 1978; Xiang 2003).

Stassen (1985) claims that standards in Exceed Comparatives are always nominal, and clearly the standard constituent in conjoined comparatives are by definition clausal.

The individual/degree comparison distinction should correlate with complexity of standard: only languages with degree comparison will allow standards with the syntax and semantics of degree descriptions.

2.4.4 Measure phrases

I do not have sufficient data to know whether all of the comparative types illustrated here accept differential measure phrases. What is clear, however, is that comparatives often license the use of measure phrase that are impossible in the corresponding form. We see this in the following English examples:

(42)   a.   10 cm long/*short
       b.   *2 kilos heavy/light

(43)   a.   Line A is 10 cm longer/shorter than line B.
       b.   Object A is 2 kilos heavier/lighter than object B.

And more drastically in a language like Japanese, in which positive adjectives (almost) uniformly prohibit measure phrases:

(44)   a.   *Gozira-wa   sanzyuu-meetoru takai.
              Godzilla-top 30-meters   high/tall
              'Godzilla is 30 m tall.' (Though perhaps OK as 'Gozdilla is 30 m taller than some contextual standard of comparison.')
    b.   *Gozira-wa   hyaku-ton omoi.
              Godzilla-top 100-tons   heavy
              'Godzilla is 100 tonsheavy.' (Though perhaps OK as 'Godzilla is 100 tons heavier than some contextual standard of comparison.')

(45)   a.   Gozira-wa   Rodan yori sanzyuu-meetoru takai.
              Godzilla-top Rodan from 30-meters   high/tall
              'Godzilla is 30 m taller than Rodan.'
    b.   Gozira-wa   Rodan yori hyaku-ton omoi.
              Godzilla-top Rodan from 100-tons   heavy
              'Godzilla is 100 tonsheavier than Rodan.'

And for completeness:

(46)   a.   Gozira-wa   sintyoo-ga sanzyuu-meetoru da/aru.
              Godzilla-top height-nom 30-meters   cop/exist
              'Godzilla is 30 meters tall.'
    b.   Gozira-wa   taizyuu-ga hyaku-ton da/aru
              Godzilla-top weight-nom 100-tons   cop/exist
              'Godzilla weighs 100 tons.'

I will have more to say about this later.

2.5   Discussion

There is obviously a lot of fieldwork to be done, but I think we now have a fairly clear framework for the investigation:

- How do the constructions behave with respect to the tests for explicit vs. implicit comparison? In particular, what do we find when we look at conjoined comparisons, which are superficially the best candidates for an implicit comparison analysis?

- The presence/absence of comparative morphology is a real point of cross-linguistic variation; does this correlate with anything else (explicit vs. implicit comparison; degree vs. individual comparison; etc.)?

- The category/specificity of the standard marking is another obvious point of variation (directional adposition, 'than', verb, subordinator, etc.). Does choice of standard marker correlate with anything, and what is the role of the standard marker in the overall semantics of the construction?

- What is the relation between comparatives, (differential) measures, and the positive form? What can we learn about the expression of measurement by studying the distributional patterns?

Other features that need to be investigated:

1. The morphosyntactic and semantic relation between the comparative and positive forms

2. The (morpho-)syntax of other kinds of degree morphology/modifiers

3. The (morpho-)syntax of comparison with other grammatical categories (especially nominals)

There is obviously a lot to do on the empirical side. The situation is further complicated by the fact that there are a number of different options for the semantic analysis of comparatives and gradable predicates on the theoretical side. But perhaps the observations we've made so far are sufficient to narrow down the options we need to consider.....

3 Semantic analyses of gradable predicates and comparatives

3.1 Gradable predicates and the positive form

3.1.1 The vague predicate analysis

Gradable predicates denote context-dependent, possibly partial functions from individuals to truth values, whose actual extensions must be determined in the context of utterance (Wheeler 1972; McConnell-Ginet 1973; Kamp 1975; Klein 1980; Larson 1988; and maybe Neeleman, Van de Koot, and Doetjes 2004).

(47) a. $[\![tall]\!]^c = \lambda x.x$ is tall in c
      b. $[\![tall]\!] = \lambda c\lambda x.x$ is tall in c

The positive form is simply the lexical meaning of the predicate. This approach therefore entails that comparatives are always derived from the corresponding positives.

3.1.2 Scalar analyses

Gradable predicates map objects onto abstract representations of measurement (SCALES) formalized as sets of values (DEGREES) ordered along some dimension (HEIGHT, LENGTH, WEIGHT, etc.). There are two variants of this approach.

The first treats gradable adjectives as relations between individuals and degrees, assigning them denotations like (48) (see e.g., Cresswell 1977; von Stechow 1984a; Heim 1985, 2000; Schwarzschild to appear; Kennedy and McNally in press; maybe Neeleman et al. 2004).

(48) $[\![tall]\!] = \lambda d\lambda x.x$'s height $\succeq d$

The second treats gradable adjectives as functions from individuals to degrees (Bartsch and Vennemann 1972, 1973; Rusiecki 1985; Kennedy 1999).

(49) $[\![tall]\!] = \lambda x.x$'s height

The crucial difference between the relational analysis and the measure function analysis boils down to the following:

- In the former, gradable adjectives introduce degree arguments which must be saturated to generate a property of individuals.

- In the latter, gradable adjectives must combine with some other expression (possibly something that introduces a relation and a degree) in order to generate a property of individuals.

On both approaches, the positive form is semantically complex, derived by combining the lexical adjective with a 'positive' morpheme that introduces a contextual standard of comparison (or by a type-shifting rule that has the same effect).

(50)   a. $[\![pos]\!]^s = \lambda g \in D_{\langle d, \langle e, t \rangle \rangle} \lambda x.g(s(g))(x)$
        b. $[\![pos]\!]^s = \lambda g \in D_{\langle e, d \rangle} \lambda x.g(x) \succ s(g)$

Here s is the DELINEATION FUNCTION — a contextual parameter that maps adjectives to contextually appropriate standards of comparison (Graff 2000; Barker 2002; Kennedy and McNally in press; Kennedy to appear).

One exception to this generalization about the positive form is Barker 2002, which is in effect a (dynamic) scalar re-implementation of the vague predicate analysis:

(51) $[\![tall]\!]^s = \lambda x \lambda C.\{c \in C \mid x\text{'s height} \succ s([\![tall]\!])(c)\}$

Barker's analysis is 'relational' in the sense that gradable adjectives express orderings between individuals and degrees, but it is like the measure function analysis in assuming that gradable adjectives do not themselves introduce degree arguments.

Unlike the measure function analysis, however, degrees are never treated as syntactic or semantic arguments; they are used only to modify the prevailing contextual standard of comparison.

The fact that putative degree-denoting expressions like measure phrases have argument-like properties (e.g., accept case morphology, show up in argument positions in the syntax, etc.) raises some questions about this analysis for a language like English, but if we found a language in which such expressions did not have argument-like properties....

3.2   Semantic analyses of comparatives

Let us now consider the various semantic analyses of comparatives that have been proposed. For each type of analysis, I will provide the truth conditions that it assigns to (52). I will not go through potential compositional analyses, since these depend on other assumptions.

(52)   Kim is taller than Lee.

3.2.1   Implicit comparison

I believe that the analysis developed in Wheeler 1972 is an implicit comparison analysis. What he proposes is that (53a) has the truth conditions represented in (53b), where $c[\{Kim, lee\}]$ is a context just like c except that the only individuals in it are Kim and Lee.

(53)   a.   Kim is taller than Lee.
        b. $[\![tall]\!]^{c[\{kim, lee\}]}(kim)$

Assuming a general constraint that requires a predicate to have nonempty positive and negative extensions, this will entail that Kim is taller than Lee.

This analysis is slightly different from the one I presented yesterday, but it should make the same predictions — no crisp judgments, problems with absolute adjectives, no measure phrases, and so forth.

3.2.2 Negation

This is the typical approach in the vague predicate analysis. A comparative is used to assert that it is possible to construct a context in which the gradable predicate is true of the target of comparison but false of the standard:

(54) $\exists c[[\![tall]\!](c)(kim) \wedge \neg[\![tall]\!](c)(lee)] \Rightarrow \exists c[\text{Kim is tall in } c \wedge \neg\text{Lee is tall in } c]$

Note that in order to make everything work out, this analysis must also assume some version of Klein's (1980) 'Consistency Postulate', which states that if a gradable predicate is true of x and false of y in some context, then there is no context in which the reverse holds (i.e., it preserves orderings).

A question that I am not sure how to answer is whether this kind of analysis involves implicit or explicit comparison. The researchers who have advocated it clearly assumed the latter, but it is not clear to me that this is the case. The issue is whether the fact that these analyses are based on the positive form predicts that they should bring over those features of the positive form that give rise to the effects of implicit comparison (borderline cases, etc.).

Scalar versions of the negation analysis don't have to make this assumption because it follows from the ordering on the set of degrees. I will illustrate in terms of a relational semantics for gradable adjectives:

(55) $\exists d[[\![tall]\!](d)(kim) \wedge \neg[\![tall]\!](d)(lee)] \Rightarrow \exists d[\text{Kim's height} \succeq d \wedge \neg\text{Lee's height} \succeq d]$

I think that Barker (2002) has his cake and eats it too, since his truth conditions are defined in terms of degrees. This is another reason that I like this approach.

3.2.3 Ordering relations

A comparative establishes an ordering between the degree to which the target of comparison possesses the property expressed by the gradable predicate and the degree to which the standard expresses this property. Obviously, this approach is only available to analyses that assume degrees in the first place.

In the relational analysis, this is achieved by abstracting over the degree argument of the gradable predicate:

(56) $max\{d \mid [\![tall]\!](d)(kim)\} \succ max\{d \mid [\![tall]\!](d)(lee)\} \Rightarrow$
       $max\{d \mid \text{Kim's height} \succeq d\} \succ max\{d \mid \text{Lee's height} \succeq d\}$

The measure function analysis supports a more direct interpretation:

(57) $[\![tall]\!](kim) \succ [\![tall]\!](lee) \Rightarrow \text{Kim's height} \succ \text{Lee's height}$

I will come back to the issue of 'directness of interpretation' later.

3.2.4 Difference predicates

A comparative is used to assert that two objects have distinct degrees of a gradable property by introducing a 'differential' degree and saturating or existentially binding it:

(58)   The relational semantics
$\exists d[max\{d \mid [\![tall]\!](d)(kim)\} - max\{d \mid [\![tall]\!](d)(lee)\} = d] \Rightarrow$
$\exists d[max\{d \mid \text{Kim's height } \succeq d\} - max\{d \mid \text{Lee's height } \succeq d\} = d]$

(59)   The measure function semantics
$\exists d[[\![tall]\!](kim) - [\![tall]\!](lee) = d] \Rightarrow \exists d[\text{Kim's height} - \text{Lee's height} = d]$

An argument for doing things this way is that we need to assume something like to account for differential comparatives like (60) (Hellan 1981; von Stechow 1984a).

(60)   Kim is 2cm taller than Lee.

(61)   a. $max\{d \mid \text{Kim's height } \succeq d\} - max\{d \mid \text{Lee's height } \succeq d\} = 2cm$
        b.   Kim's height $-$ Lee's height $= 2cm$

Schwarzschild and Wilkinson (2002) and Schwarzschild (to appear) develop a version of this analysis in which comparatives denote differential degrees and measure phrases denote properties of degrees.

(62)   a. $\exists P[P(max\{d \mid \text{Kim's height } \succeq d\} - max\{d \mid \text{Lee's height } \succeq d\})]$
        b. $2cm(max\{d \mid \text{Kim's height } \succeq d\} - max\{d \mid \text{Lee's height } \succeq d\})$

Although a difference predicate could be tacked on to the end of a negation semantics, the fact that the former entails the latter should raise questions about positing the negative component in the first place.

3.2.5 Scale modification

Comparatives are modifiers of gradable predicates whose function is to introduce a new scale with a minimal element defined on the basis of the standard (Kennedy and McNally in press; Neeleman et al. 2004). This also presupposes a scalar semantics for gradable predicates (but see Wheeler 1972 for vague predicate approach in the same spirit).

This is easiest to illustrate if we assume the measure function analysis (though it could be implemented in terms of the relational analysis). The propsoal is illustrated by (63)-(64):

(63) $[\![tall]\!]$ = the function h from individuals to:
        HEIGHT: 0 ⟶∞
        such that $h(x) = x$'s height

(64) $[\![er\ than\ Lee]\!]([\![tall]\!])$ = the function h' from individuals to the $[\ —\ ]$ part of:
        HEIGHT: 0 - - - - Lee's height - - - - -[● ⟶∞]
        such that if $[\![tall]\!](x) \succ [\![tall]\!](Lee)$ then $h'(x) = x$'s height, else $h'(x) = ●$

Since comparative predicates denote measure functions, not properties of individuals, they need to combine with *pos* (or some other degree morphology) to derive a property of individuals.

(65) $pos(\llbracket \text{taller than Lee} \rrbracket)(Kim) \Rightarrow$
   $\llbracket \text{taller than Lee} \rrbracket(Kim) \succ \mathbf{stnd}(\llbracket \text{taller than Lee} \rrbracket)(c)$

Assuming with Kennedy and McNally (in press) that the standard of comparison assigned to predicates that use scales with minimal values is not context-dependent, but rather defaults to the minimum, (65) is equivalent to (66a), which is equivalent to (66b).

(66) a. $\llbracket \text{taller than Lee} \rrbracket(Kim) \succ min(\text{SCALE}(\llbracket \text{taller than Lee} \rrbracket))$
   b. $\llbracket \text{tall} \rrbracket(Kim) \succ \llbracket \text{tall} \rrbracket(Lee)$

I.e., if you have a non-zero degree of taller-than-Lee-ness, then you are taller than Lee.

This approach differs from the various other scalar approaches in NOT treating the comparative as type-changing. It is therefore expected that comparatives should be able to further combine with degree morphology, such as intensifiers (*much taller than*), comparative morphology (*as much taller than*), and measure phrases.

In particular, measure phrases in differential comparatives can be analyzed in (almost!) the same way as measure phrases with the positive form. As we will see below, compositionally (67a) is identical to (67b) (in the relevant respects).

(67) a. [2 meters [tall]]
   b. [2 meters [taller than Lee]]

4   Assessment

4.1   Implicit vs. explicit comparison

As mentioned above, it may turn out to be the case that vague predicate analyses are compatible only with implicit comparison. If the implicit/explicit distinction turns out to be a real point of cross-linguistic variation (i.e., if some languages have only implicit comparison), this would suggest the following parameter of variation:

(68) *The Degree Type Parameter*
   Languages may vary in whether they make use of the semantic type 'degree'.

Languages that don't use the semantic type degree may still make reference to degrees in their truth conditions (as in Barker's analysis), but they would be forced to analyze the comparative in terms of the positive form.

4.2   Markedness

The Vague Predicates Analysis of gradable adjective meaning appears to do the best job at explaining why comparatives are typically the marked form, since the comparative is derived from the meaning of the positive.

In contrast, all but one of the various Scalar Analyses treat the comparative and positive forms as 'equally marked': the positive form is a combination of *pos* + A, and the comparative is a combination of *er ... than* + A.

The exception is the Scale Modification Analysis, which is (in a way) the reverse of the vague predicate analysis: since comparatives are not type changing, the constituency of the positive and copmarative forms respectively is:

13

(69)   a.   [*pos* A]
        b.   [*pos* [*er … than* A]]

So comparatives are indeed more complex than the corresponding positives. A point in favor of the Scale Modifier Analysis?

A caveat to these observations is the fact that many languages do not make a morphological distinction between positive and comparative forms, though comparatives are always in some sense more marked in requiring (semantically, at least) an explicit standard.

4.3   Differential phrases

By themselves, only the Difference Predicates Analysis and the Scale Modification Analysis can handle measure phrases; the Negation and Ordering Relations Analyses need to be supplemented with a differential semantics, as noted above.

Moreover, von Stechow (1984a) has argued that the vague predicate analysis of gradable adjective meaning cannot handle differential comparatives at all. (Barker (2002) avoids this problem by introducing degrees at the level of the discourse model.)

- If it does turn out the be the case that all comparative types support differential expressions, then Occam's Razor certainly dictates a move towards the Difference Predicates or Scale Modifier Analyses.

Focusing on these two analyses, there is one potential argument for the latter: it arguably does a better job of explaining the relation between differentials and the comparative/positive forms. Let's first consider Schwarzschild's (to appear) explanation of facts like (70).

(70)   a.   *Kim is 75 kilos heavy.
        b.   Kim is 74 kilos heavier than this 1 kilo bag of potatoes.

Schwarzschild's Difference Predicate semantics for the comparative has the consequence that comparatives have a different semantic type from lexical adjectives: the former are standard relations between individuals and degrees; the latter denote differential degrees. Something like the following:

(71)   a.   [[heavy]] $= \lambda d \lambda x.x$'s weight $\succ d$
        b.   [[heavier than B]] $= \lambda P \lambda x.P(x$'s weight $-$ B's weight)

Measure phrases, in turn, are predicates of degrees. As a result, they can combine freely with comparatives (assuming they express the right kind of measurement for the scale), but not with lexical adjectives.

This means that (71a) is uninterpretable for Schwarzschild. In fact, according to him, this is the <u>basic case</u>. So languages like Japanese are the norm; English, which disallows (71a) but allows (72), is exceptional.

(72)   Kim is 2 m tall.

Schwarzschild explains (72) by proposing the type-shifting rule in (73) [slightly modified by CK], which is lexically specified as to the adjectives that it can apply to.

(73)   If A denotes a relation between individuals and degrees, then A has a sec-
        ondary meaning A' relating individuals to predicates of degrees, such that:
        $[\![A']\!] = \lambda P \lambda x . P(max\{d \mid [\![A]\!](d)(x)\})$

This rule is lexically specified to apply to *tall* in English but not to *heavy*; Norwegian
and German can apply it to *heavy* as well; Japanese doesn't allow it at all.

I think that Schwarzschild's core claims are exactly right:

- Measure phrases should not be able to freely combine with 'unmarked' adjectives,
  in constrast to comparative adjectives.

- There needs to be some way of lexically specifying for particular languages which
  adjectives can do this.

However, I think there is a fundamental problem with his implementation: it does not
rule out the possibility of type shifting the measure phrase, which denotes a property of
degrees in his analysis. Something along the lines of (74) seems like a good candidate for
a measure phrase type-shifting rule (cf. Partee 1987).

(74)   If M denotes a property of degrees, then M has a secondary meaning M' that
        introduces a degree, such that: $[\![M']\!] = \iota d . [\![M]\!](d)$

If this were possible, there would be no way to restrict the derived meanings from com-
bining with arbitrary adjectives, and we'd lose the account of *75 kilos heavy*, etc.

An alternative analysis that captures the spirit of Schwarzschild's proposal but doesn't
run into this problem is proposed in **?**. First I'll give the uninteresting but effective
version, then the more interesting but possibly more problematic one.

S&K adopt a measure function analysis of GAs, and propose that syntactic degree argu-
ments are introduced by a special degree morpheme *meas*. This predicate is restricted to
combine only with those predicates that use scales with definied measurement systems,
as specified in (75) (where **MeasPred** abbreviates the relevant set).

(75) $[\![meas]\!] = \lambda g_{\langle e,d \rangle} : g \in \mathbf{MeasPred}\lambda d\lambda x.g(x) \succeq d$

S&K show how this proposal explains some unusual facts about degree questions in a
dialect of Norwegian, which I don't have time to discuss.

What's relevant to the current discussion is that since this morpheme is a lexical item,
it is possible to lexically encode which adjectives it can combine with, accouting for the
contrast between e.g. (76a) and (76b) in terms of syntactic selection.

(76)   a.   DegP   b.   *DegP

            2 meters   Deg'   75 kilos   Deg'

                        Deg   AP   Deg   AP

                        meas   tall   meas   heavy

Recall that the Scale Modification Analysis entails that comparatives are of the same
semantic type as lexical adjectives; as a result, they can combine with *meas* as long as
they use appropriate scales.

The comparative constituent is still syntactically distinct from the lexical adjective, though. For example, Corver (1997a,b) has argued that they involve an extra level of functional morphology between A and Deg, as in (77a); alternatively, it might be the case that the adjective enters the syntax already marked as comparative, as in (77b). (See Neeleman et al. 2004 for a variant of this idea.)

(77) a.

```
                    DegP
                   /    \
                 Deg     QP[+COMP]
                  |        /    \
                 pos   Q'[+COMP]  PP
                        /    \     |
                 Q[+COMP]   AP   than B
                      |      |
                     er    heavy
```

b.

```
              DegP
             /    \
           Deg    AP[+COMP]
            |      /    \
           pos  A[+COMP]  PP
                   |       |
                 heavier  than B
```
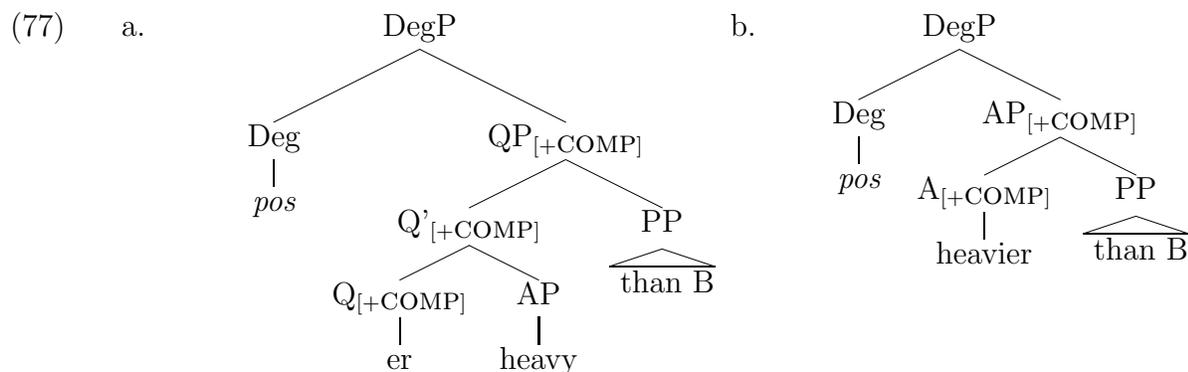
In (77a-b) DegP is headed by *pos*, which derives the basic comparative truth conditions. But Deg could also be headed by *meas*, since the weight scale supports measurement. This licenses projection of a measure phrase:

(78)

```
               DegP
              /    \
         74 kilos   Deg'
                   /    \
                 Deg    AP[+COMP]
                  |      /    \
                meas  A[+COMP]  PP
                         |       |
                      heavier  than B
```
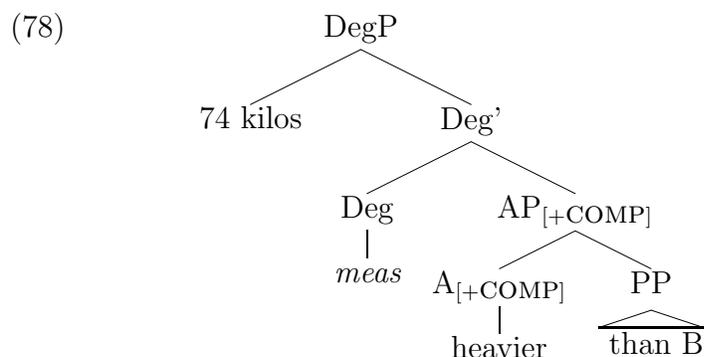
We then complete the picture by saying that cross-linguistically, *meas* selects for AP[+COMP], but it selects for non-comparative APs on a restricted, language specific basis. E.g.:

(79) a. English
$[_{\text{Deg}}\ \text{meas}]: [\_\_ \{\text{AP}_{[+\text{COMP}]}, \text{AP}_{[\text{HEAD}\in\{tall,deep,...\}]}\}]$
      b. German
$[_{\text{Deg}}\ \text{meas}]: [\_\_ \{\text{AP}_{[+\text{COMP}]}, \text{AP}_{[\text{HEAD}\in\{schwer,schnell,...\}]}\}]$
      c. Japanese
$[_{\text{Deg}}\ \text{meas}]: [\_\_ \text{AP}_{[+\text{COMP}]}]$

That's the effective version. The more interesting one explains why *meas* can always combine with a comparative in terms of the meaning of comparatives. The central idea is that it is not a type distinction that differentiates comparatives and unmarked adjectives, but rather a scalar one: comparatives are special in always having scales with zero elements. The starting point is the contrast in (80).

(80) a. $[_{\text{DegP}}$ 8 months $[_{\text{Deg'}}$ *meas* $[_{\text{AP}}$ old]]]
      b. *$[_{\text{DegP}}$ 8 months $[_{\text{Deg'}}$ *meas* $[_{\text{AP}}$ young]]]

What rules out (80b) if the age scale allows measurement? The answer is a scalar one: 'negative' adjectives map their arguments onto unmeasurable scalar intervals (Seuren 1978; von Stechow 1984b; Kennedy 2001):

(81)   AGE: 0 ——— $[\![old]\!](x)$ ———•——— $[\![young]\!](x)$ ——————→∞

The semantics of comparatives always introduces a zero point, however, regardless of the polarity of the adjective. It therefore entails that both positive and negative comparatives map their arguments onto measurable degrees, as is illustrated in (82)-(83).

(82)   a. $[_{\text{DegP}}$ 8 months older than Sam]
       b.   AGE: 0 - - - - Sam's oldness - - - - -[• — **8 mos** —•——————→∞]

(83)   a. $[_{\text{DegP}}$ 8 months younger than Sam]
       b.   AGE: $[0$ ←———————•— **8 mos** —•]- - - - Sam's youngness - - - - - - - - -→ ∞
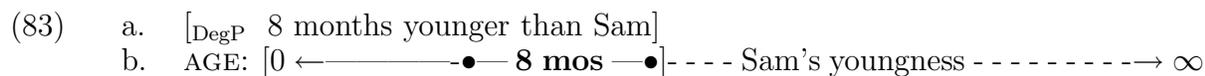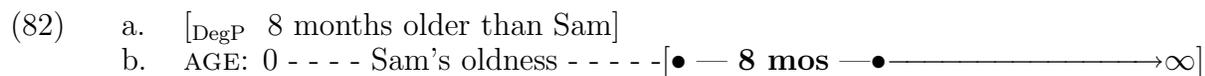
So, one idea to consider is that the class of lexical adjectives that generally appear with measure phrases (Bierwisch's (1989) DIMENSIONAL ADJECTIVES) do not (contrary to appearance) have scales that are compatible with measure phrases.

Specifically, we could hypothesize that the ordering expressed by *meas* presupposes that both of its arguments (the measure phrase and the adjective/individual constituent) express degrees (intervals) that originate at the zero point of a scale.

And in fact, if we look at the adjectives that allow measurement in English, we see that they do not use scales with zero points: compare (84)-(85) with (86) (see Kennedy and McNally in press for relevant discussion).

(84)   HEIGHT
       a. ??completely/absolutely/100% short
       b.   not tall $\not\Rightarrow$ doesn't have height
       c. $[\![$is tall$]\!]$ = has a height that exceeds a contextual standard/RELATIVE

(85)   DEPTH
       a. ??completely/absolutely/100% shallow
       b.   not deep $\not\Rightarrow$ doesn't have depth
       c. $[\![$is deep$]\!]$ = has a depth that exceeds a contextual standard/RELATIVE

(86)   BEND
       a. ??completely/absolutely/100% straight
       b.   not bent $\Rightarrow$ doesn't have bend
       c. $[\![$is bent$]\!]$ = has a non-zero degree of bend/ABSOLUTE

So perhaps what is language specifically encoded in the meaning of *meas* is a 'scale shifting principle' that allows it to treat certain adjectives as having scales with zero points. This list must be specified in the lexical entry of *meas*, and is subject to cross-linguistic variation.

Nothing special needs to be said about comparatives, because they always use scales with zero points, as described above.

This hypothesis predicts that if a lexical adjective uses a scale with a zero point, it should

in principle allow measure phrases (i.e., if the scale has a measurement system). One set of adjectives that allow measure phrases cross-linguistically (in both the positive and negative forms!) are the following (Kennedy 2001; Schwarzschild to appear):

(87)   a.   10 minutes early/late
       b.   10 minutes fast/slow (of a watch)
       c.   10 Hz flat/sharp

What's special about these is that they measure in different directions from a (contextually defined) zero point: 'on time'. In some languages, these are overtly comparative (Hungarian), but they don't have to be.

There's more work to be done here, but on the whole it looks like another point for the Scale Modification Analysis.

4.4   Transparency

The Negation Analysis appears to most transparently reflect the surface form of the various types of Conjoined Comparatives and comparatives that involve 'expletive' negation, though it is a less transparent representation of the surface form of the other types.

However, the fact that many conjoined comparative languages also contain a comparative morpheme is perhaps unexpected: all the 'work' is being done by negation and existential binding of a variable in the adjective denotations, so we could imagine not needing such a morpheme. Of course, this could just be the locus of the relevant information, as in the compositional analyses of English developed by Klein and Larson.

I think a case can be made that the Measure Function analysis of GAs together with the Scale Modification Analysis of comparatives also provide a fairly transparent semantics for the varieties of comparative constructions we see in the typology.

First, the hypothesis that adjectives denote measure functions means that they are always going to have to combine with something to derive properties of individuals. But that something is indeterminate: it could be a bound morpheme, it could be a free morpheme, or it could be a phrase. The first (or third) options are what we typically see; the second option is what we see in the case of Exceed Comparatives.

In contrast, the relational analysis of GAs, in which they introduce degree arguments, generates the expectation that comparatives should be argument-like. This looks OK for English-like languages, but more needs to be said about Exceed-type languages.

Second, we could assume that every language has a comparative morpheme (sometimes null) with a denotation along the lines of (88).

(88) $[\![\text{COMP}]\!] = \lambda g \lambda s \lambda x.$the function h' from individuals to the subpart of the g scale whose minimal value ζ is the degree determined by s, such that if $g(x) \succ \zeta$, then $h'(x) = g(x)$, else $h'(x) = \zeta$.

A potential point of cross-linguistic variation (beyond the categorial status of the comparative morpheme), on this view, is the nature of s: how is the zero point of the derived scale identified? There are a number of potential possibilities:

1. Let s directly denote a degree, and let this degree be the zero point. This is the strategy taken in e.g. English clausal comparatives.

2. Let s be an individual, and derive a (derived) zero degree by applying the measure

function expressed by the adjective to it. This may be the strategy taken in English phrasal comparatives and (as I will suggest below), <u>all</u> comparatives in the Separative Comparative language Japanese.

3. Let s be an interval that is used to determine the zero point. Here there are two options:

   (a) $s = \{d \mid \neg[\![A]\!](x) \succ d\}$
       $\zeta = min(s)$

   (b) $s = \{d \mid [\![A']\!](x) \succeq d\}$(where A' is the antonym of A)
       $\zeta = max(x)$

   Option 3a is the strategy taken in conjoined negative comparatives; option 3b is the strategy taken in conjoined antonym comparatives.

A question that needs to be addressed is whether there is some deeper factor or factors that determine which of these options are taken. To some extent, this may depend on the status of the comparative morpheme: if it is a verb, as in many Exceed Comparatives, that could force option 2 for case reasons (verbs want DP arguments).

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