Topics in Semantics
24.979

Scale Structure, Degree Modification and the Semantic Typology of Gradable Predicates

1 Degree modification in deverbal gradable adjectives

1.1 Some distributional facts

The degree modifiers *well, much* and *very* appear to have very similar syntactic and semantic properties: they all apply to deverbal gradable adjectives, and they all 'boost' the degree to which the deverbal adjective holds of its subject.

(1) a. Beck was (well) acquainted with the facts of the case.
b. Their vacation was (much) needed.
c. Al was (very) surprised by the results of the election.

However, these modifiers differ in terms of their acceptability with different adjectival participles. In fact, as shown by the following examples, their distributions are largely complementary (see Knowles 1974 for discussion of the complementarity of *very* and *much*):

(2) a. Martin Beck is well/??very/??much acquainted with the facts of the case.
b. This is a well/??very/??much known problem.
c. The facts are well/??very/??much understood.
d. The concert seemed well/??very/??much publicized.
e. The well/??very/?much documented abuse of public funds continued during subsequent administrations.

(3) a. Department chair is a much/??well/??very desired position.
b. She took a much/??well/??very needed rest.
c. That film was much/??well/??very praised.
d. This novel seems to be much/??well/??very talked about in the trade journals.

(4) a. A very/??well/??much surprised face peered out of the window.
b. Kim was very/??well/??much pleased by the reviewer's report.
c. People should very/??well/??much concerned by the changes in global weather patterns.

These judgments are mirrored by distributional asymmetries in corpus data (the counts are from the first edition of the British National Corpus (http://info.ox.ac.uk/bnc) reflect the number of hits in a search of approximately 100 million words):

Maybe these participles aren't gradable adjectives? That can't be the answer (cf. Borer 1998, pp. 92-93)

1. They can be prefixed with negative *un-*:

(5) a. Beck is *unacquainted* with the facts of the case.
b. For in a world as yet *unacquainted* with the horrors of the mushroom cloud, poison gas was still regarded as the ultimate in hideous weapons. [Brown F02]
c. The singer's *unpublicized* appearance caused a commotion at the restaurant.

Table 1: Distribution of degree modifiers in the British National Corpus

	well	*very*	*much*
protected	62	2	0
educated	78	3	0
defined	146	2	0
needed	2	0	211
appreciated	12	0	134
prized	0	1	16
surprised	0	154	5
worried	0	192	1
frightened	0	92	0

d. These claims are *undocumented*, and therefore not admissible in court.
e. *uneducated, undefined, unprotected*
f. *unneeded*, *undesired*, *unpraised*, *unappreciated*

2. They can appear as complements to copular verbs such as *seem*, *remain* or *become*:

(6) a. Beck seemed *acquainted* with the facts of the case.
b. The phenomenon remains poorly *understood*.
c. The scandal became *publicized* after a leak to the press.
d. The case remained *documented* on file.

3. They appear in comparative constructions:

(7) a. But as I became *more acquainted* with this set and stopped rushing from impossible passage to impossible passage, hoping against hope that at some point he would lose his balance and tumble like a second-rate trapeze artist off his swing, I was unwittingly dragged in to a more sinister, melancholic side to his playing. [*CD Review*, 1992. (BNC)]
b. The causes of weakness in adhesion are rather *less understood* at present than they are in cohesion but no doubt they are rather similar in character. [J. Gordon, *The New Science of Strong Materials*. 1991. (BNC)]
c. This was certainly more dramatic than the *more publicized* event that finished off the dinosaurs. [Antony Milne, *The Fate of the Dinosaurs: New Perspectives in Evolution*. 1971. (BNC)]
d. He was *more talked about* than if he had been open and obvious. [Jean Bow, *Jane's Journey*, 1991. (BNC)]
e. ...virginity was *more prized*, promiscuity was frowned upon. [W.F.R. Stewart, *Sexual Aspects of Social Work*, 1979. (BNC)]

We conclude that the facts in (2)-(4) cannot be explained in terms of category mismatch.

1.2 Some interpretive facts

In many cases *well* appears to be ambiguous between a degree reading and a 'quality' reading:

(8) a. Beck was well acquainted with the facts of the case.
b. The concert seemed well publicized.

In the examples in (9), however, *well* has only a quality reading.

(9) a. The book was well written.
b. The house was well built.

The following is a nice minimial pair:

(10) a. Olive was well prepared for her talk.
b. Olive's talk was well prepared.

What's going on here?

1.3 The plan

There are two main goals of today's discussion:

1. To use the distribution of degree modifiers as a starting point for developing a semantic analysis of gradable predicates that supports a typology parameterized along two core features:

- The structure of the scale that a gradable property uses as a basis for ordering the objects in its domain: whether it is closed or open (cf. Paradis 2001).
- The nature of the standard of comparison: whether it is context-dependent or not.

2. To argue that the scalar properties of gradable expressions are largely predictable from properties of the events and individuals which they denote or to which they apply and, moreover, that scale structure is shared by derivationally-related lexical items — for example, deverbal adjectives and source verbs (cf. Yumoto 1991).

2 The semantic type of gradable predicates

Let's start take a version of the degree analysis as a starting point, but we should ask ourselves later how a Klein-style analysis can explain somoe of the data we discuss. From last time:

1. Gradable adjectives map their arguments onto abstract representations of measurement, or DEGREES.
2. Degrees are formalized as points or intervals totally ordered along some DIMENSION (e.g., height, cost, etc.; the set of ordered degrees corresponds to a SCALE.
3. Propositions constructed out of gradable adjectives define relations between degrees on a scale.

Gradable adjectives denote relations between individuals and degrees (see Seuren 1973; Cresswell 1977; Hellan 1981; von Stechow 1984; Heim 1985; Bierwisch 1989; Klein 1991; Kennedy 1999 and others), which contain as part of their meanings a measure function and a partial ordering relation:

(11) a. $[\![[_{\text{A}}\ \text{GrAdj}]]\!] = \lambda d\lambda x.\mathbf{m}(x) \succeq d$
b. $\mathbf{m}$ = a function from objects to degrees

Let's further assume the 'contextual restriction' analysis of the positive form in (12a), where the default value of $\mathbf{C}$ is something like (12b).

(12) a. $[\![[_{\text{AP}}\ \text{GrAdj}]]\!] = \lambda x.\exists d[\mathbf{C}(d) \wedge \mathbf{m}(x) \succeq d]$
b. *$\lambda d.d$ is greater than average degree to which the members of some contextually determined comparison class have the property in question*

This is clearly way too vague (so to speak), but let's worry about how the value of $\mathbf{C}$ is actually determined next time.

Example:

(13) Pug is old.
a. $\exists d[\mathbf{C}(d) \wedge \mathbf{old}(pug) \succeq d]$
b. $[\![\mathbf{C}]\!]_{c1}$ = *$\lambda d.d$ is greater than the avg degree to which the class of dogs is old*
c. $[\![\mathbf{C}]\!]_{c2}$ = *$\lambda d.d$ is greater than the avg degree to which the class of pugs is old*

Finally, let's assume that degree morphemes have interpretations along the lines of (14): their function is to restrict the value of the degree argument of the adjective.

(14) $[\![\text{Deg(P)}]\!] = \lambda G\lambda x.\exists d[\mathbf{R}(d) \wedge G(d)(x)]$

Different degree morphemes differ on the value of the restrictive clause $\mathbf{R}$. For example, the comparative morphemes restrict the degree argument as shown in (15), where d_c is the semantic value of the comparative clause. (We'll worry later about how everything is compositionally derived.)

(15) a. more: $\mathbf{R} = \lambda d.d \succ d_c$
b. less: $\mathbf{R} = \lambda d.d \prec d_c$
c. as: $\mathbf{R} = \lambda d.d \succeq d_c$

(16) Pug is older than Sadie.
a. $\exists d[d \succ max\{d' \mid \mathbf{old}(sadie) \succeq d'\} \wedge \mathbf{old}(pug) \succeq d]$
b. $[\![[_{\text{Deg(P)}}\ \text{-er than Sadie}]]\!] = \lambda G\lambda x.\exists d[d \succ max\{d' \mid \mathbf{old}(sadie) \succeq d'\} \wedge G(d)(x)]$

3 Scale structure and standard of comparison

Are scales and degrees are merely convenient formal tools for representing the meanings of gradable adjectives, or do their properties have have linguistic significance?

Kennedy and McNally (2002): certain structural properties of scales – in particular, whether they have minimal and maximal elements (whether they are open or closed) — correlate to a large degree with whether a GA invokes a context-dependent standard of comparison.

K&M also argue that this feature plays a crucial role in explaining the degree modifier facts.

3.1 A Basic typology of scale structures

Formally, a scale can be defined as a set of objects S asymmetrically ordered along some dimension δ.

(17) $\langle S, \succeq_\delta \rangle$

In principle, scales could be distinguished either by properties of the set of objects or by properties of the ordering relation.

Evidence that the nature of the ordering relation (in particuar, the dimensional parameter) is linguisticaly significant: *incommensurability*.

(18) a. They call him 'The Bus' because he's kind of as wide as he is tall. (National Public Radio broadcast, 1/26/02)
b. [This comparison] is unfair both to him and the quarterbacks like Dan Marino and John Elway who excelled for almost as long as [Peyton] Manning is old. (*Chicago Tribune*, 11/2/00)

(19) a. ??They call him 'The Bus' because he's kind of as wide as he is punctual.
b. ??These quarterbacks excelled for almost as long as Peyton Manning is talented.

Assuming that orderings along different dimensions entail different scales, and that comparative morphemes presuppose that the degrees they order come from the same scale (see Kennedy 2001), the examples in (19) are correctly predicted to be anomalous.

- **NB:** The pairs of adjectives in (18) may make use of the same scales, but they still differ with respect to the measure functions they incorporate, which provide different perspectives on the property they measure. For example, *wide* corresponds to a horizontal perspective on linear extent, and *tall* to a vertical one, with the result that the two adjectives impose different orderings on the same domains.

Turning to scale structure, several different properties of the scale could in principle be linguistically significant:

- whether the set of degrees is finite or infinite
- whether it is dense or discrete
- whether it contains minimal or maximal elements
- ...

Let's focus on the OPEN (no minimal/maximal elements) vs. CLOSED (minimal/maximal elements) distinction. Intuitively, this looks like the right way to characterize the difference between the adjectives in (20a) and those in (20b).

(20) a. *Open scale adjectives?*
long, short, fast, slow, interesting, inexpensive, ...
b. *Closed scale adjectives?*
empty, full, dry, clean, open, closed, ...

This intuition is supported by linguistic data involving PROPORTIONAL MODIFIERS like *completely, partially*, and *half*, which are acceptable with some gradable adjectives and unacceptable with others:

(21) a. completely {empty, full, open, closed}
b. partially {empty, full, open, closed}
c. half {empty, full, open, closed}

(22) a. ??completely {long, short, interesting, inexpensive}
b. ??partially {long, short, interesting, inexpensive}
c. ??half {long, short, interesting, inexpensive}

However: Is it possible that these expressions are actually modifiying the argument of the adjective, and so don't actually tell us anything about scale structure?

(23) a. The shirt is completely/half/partially dry.
b. All/half/part of the shirt is dry.

This may be possible (it's worth exploring at least), but I think that these modifiers also need to be able to modify the adjectives.

(24) a. Eight glasses are half full. $\neq$ Half of eight glasses are full.
b. Few rooms were completely empty. $\neq$ All of few rooms were empty.

(25) a. ??The books were completely inexpensive.
b. All of the books were inexpensive.

(26) a. ??The boys were half tall.
b. Half of the boys were tall.

(27) a. ??The shirt is half drier than the pants.
b. Half of the shirt is drier than the pants.

If the modifiers *completely, half* and *partially* have interpretations along the lines of those in (28), where $S(G)$ returns the scale associated with a gradable adjective G, they should be compatible only with adjectives that map their arguments onto scales with maximal or minimal elements. (The DIFF function returns the difference between two degrees; see Kennedy 2001.)

(28) a. $[\![\text{completely}]\!] = \lambda G \lambda x. \exists d[d = max(S(G)) \wedge G(d)(x)]$
b. $[\![\text{half}]\!] = \lambda G \lambda x. \exists d[\text{DIFF}(max(S(G)), d) = \text{DIFF}(d, min(S(G))) \wedge G(d)(x)]$
c. $[\![\text{partially}]\!] = \lambda G \lambda x. \exists d[d \succ min(S(G)) \wedge G(d)(x)]$

Two questions: 1) What are the parameters of variation in scale structure? 2) How are these parameters encoded lexically? Today we'll focus on the first question. See McNally and Kennedy 2002 and Koenig 1992 for some answers to the second one.

(29) *Some initial assumptions*
i. Scales consist of sets of points that are isomorphic to the real numbers between 0 and 1.
ii. Scales may or may not have maximal and minimal elements.

These assumptions predict the typology in (30).

(30) *A typology of scale structures*

a.	$\langle S_{(0,1)}, \preceq_\delta \rangle$	OPEN
b.	$\langle S_{[0,1)}, \preceq_\delta \rangle$	LOWER CLOSED
c.	$\langle S_{(0,1]}, \preceq_\delta \rangle$	UPPER CLOSED
d.	$\langle S_{[0,1]}, \preceq_\delta \rangle$	CLOSED

Are all of these options actually attested? Proportional modifiers provide a useful probe, but we need to take adjectival polarity into account.

Both members of an antonymous pair map their arguments onto the same scale (e.g., both *tall* and *short* map their arguments onto a scale of height), but they make use of inverse ordering relations. This fact is illustrated by tautologies like (31).

(31) The Sears Tower is taller than the Empire State Building if and only if the Empire State Building is shorter than the Sears Tower.

The feature of polarity that is important to us is the following: if the positive member of an antonym pair has a maximal degree, then this corresponds to the minimal degree for the negative adjective, and vice-versa.

This is most clearly illustrated by a pair like *full/empty*: if a cup is maximally full, then it is minimally empty (not empty at all); likewise, if it is maximally empty, then it is minimally full (not full at all).

Result: Proportional modifiers that pick out maximal degrees should be acceptable with positive adjectives only if they use a scale with a *maximal* element, and with negative adjectives only if they use a scale with a *minimal* element.:

(32)

	OPEN	L-CLOSED	U-CLOSED	CLOSED
$[\text{Deg}_{max}\ \text{A}_{pos}]$	??	??	√	√
$[\text{Deg}_{max}\ \text{A}_{neg}]$	??	√	??	√

Focusing on the maximizing modifier *absolutely*, the expected pattern does in fact emerge:

(33) *Open scales*

a. ??absolutely {tall, deep, expensive, likely}
b. ??absolutely {short, shallow, inexpensive, unlikely}

(34) *Lower closed scales*

a. ??absolutely {possible, bent, bumpy, wet}
b. absolutely {impossible, straight, flat, dry}

(35) *Upper closed scales*

a. absolutely {certain, safe, pure, accurate}
b. ??absolutely {uncertain, dangerous, impure, inaccurate}

(36) *Closed scales*

a. absolutely {full, open}
b. absolutely {empty, closed}

Of course, this test presupposes that we know in advance which is the positive and which is the negative member of a pair of adjectives. It's possible that we could be wrong, in which case (34) and (35) would collapse.

More needs to be done here, but we have at least some initial evidence that the four basic scale types in (30) are attested, and that this is a possible point of variation for different gradable adjectives.

3.2 The context (in)dependence of the standard

Some recent work that argues for the linguistic significance of adjectival scale structure:

- Vanden Wyngaerd (2001): the open/closed scale distinction is relevant to the licensing of resultative predicates in Dutch
- Wechsler (2002): similar claims for English
- Rotstein and Winter (2001): the open/closed distinction underlies the 'total' vs. 'partial' predicate distinction identified by Yoon (1996)
- Tsujimura (2001): this distinction is relevant for the licensing of the degree modifier *totemo* ('very'!) in Japanese

Kennedy and McNally (2002): Scale structure also influences the determination of the standard of comparison.

An expectation of the approach to gradable adjective meaning outlined above (the general structure of which is shared by all scalar analyses) is that all predicates headed by (unmodified) gradable adjectives should give rise to the sort of vagueness observed with *tall* and *expensive*.

We have already seen that this is not the case, however. In the first class, I claimed that we need to make a distinction between RELATIVE adjectives like *tall*, which have context-dependent standards of comparison, and ABSOLUTE adjectives, which do not.

Absolute adjectives come in two types. Those in (37) simply require their arguments to possess some *minimal* degree of the gradable property they introduce.

(37) *Minimum standards*
   a. The baby is awake.
   b. The table is wet.
   c. The door is open.
   d. The rod is bent.

In contrast, the adjectives in (38) require their arguments to posses a *maximal* degree of the property in question.

(38) *Maximum standards*
   a. The glass is full.
   b. The road is flat.
   c. The door is closed.
   d. The rod is straight.

A reasonable objection: This characterization of the facts is both too strong and too weak: the adjectives in (37) actually require something significantly more than a minimum standard, and those in (38) actually allow something less than a maximum standard.

(39) a. I'm not awake yet.
b. The theater is empty tonight.

(39a) can be felicitously uttered by someone who is not talking in his sleep. Similarly, (39c) can be used to describe a situation in which only a very few people show up to a film in a very large movie theater.

One response: There are coherent theoretical explanations for 'imprecise' uses of absolute adjectives. The simplest strategy would be to claim that the propositions conveyed by the sentences in (39) are strictly speaking *false* in the contexts described, and explain their felicity and informativity in terms of general pragmatic principles governing the interpretation of 'loose talk' (this is essentially Unger's position).

This idea can be implemented in terms of Lasersohn's (1999) theory of PRAGMATIC HALOS, which provides a framework for determining how much deviation from what is actually true counts as 'close enough to the truth' in any context.

- The context can associate with any expression of the language a set of denotations of the same type as its actual denotation, which differ only in some respect that is pragmatically ignorable in the context; this is its pragmatic halo.
- Any value in the pragmatic halo of an expression α counts as an acceptable and informative approximation of α even if this leads to a proposition that is strictly speaking false.

A more convincing response: There are compelling empirical arguments for making a semantic distinction between relative and absolute adjectives, and in turn concluding that context-(in)dependence of the standard of comparison is a feature that is largely determined by linguistically-encoded properties of gradable adjectives.

3.2.1 For-PPs

As shown by (40), *for*-PPs can be used to introduce the comparison class with respect to which a context-dependent standard is determined.

(40) a. The baby is {tall, short, fast, talkative} for a two year old.
b. That table is {small, sturdy, unusual} for a dining room table.
c. That glass is {expensive, clean, dirty} for a wine glass.
d. The door is {strong, big, wide} for an office door.

This type of *for*-PP is infelicitous with absolute adjectives like those in (37) and (38), however, which follows if the interpretation of these adjectives does not involve reference to a context-dependent standard: the for-PPs in (41) contribute nothing to the assertion.

(41) a. ??The baby is awake for a kid who hasn't napped all morning.
b. ??That shirt is wet for something that has been hanging on the line all day.
c. ??That glass is full for a wine glass.
d. ??That door is closed for a door in this department.

Note that these facts do not indicate that these adjectives are not gradable:

(42) a. The baby is more awake now than it was a few minutes ago.
b. The table is wetter than the floor.
c. My glass is fuller than your glass.
d. The door is more closed than it needs to be.

(43) a. ??The energy we use these days is more nuclear than it was before they built that plant down the road.
b. ??Dinosaurs are more extinct than spotted owls.

3.2.2 Shifting standards

Two similar arguments show that it is not possible to shift the standards of absolute adjectives in contexts in which the standards of relative adjectives can be easily shifted. The first comes from antonyms.

1. It is possible to sequentially describe an object in terms of both members of a relative antonym pair in a single context, since the standard for the second member of the pair can be appropriately shifted up or down to be consistent with that introduced by the first.

(44) a. Mercury is a small planet, but it's still quite large.
b. The Mars Pathfinder mission was expensive, but it was inexpensive compared to other missions to outer space.

In contrast, absolute antonyms cannot be felicitously predicated of the same object in the same context:

(45) a. ??This is a full theater, though it's still quite empty.
b. ??The students are awake, but they're asleep for kids who are supposed to be paying attention.

2. Relative GAs can be used to distinguish one object from another, even when the degree to which that object possess the property is less than the standard of comparison in that context (Kyburg and Morreau 2000; Sedivy, Tanenhaus, Chambers, and Carlson 1999).

CONTEXT: One farmer is negotiating with another farmer over two pigs (adapting an example from Kyburg and Morreau). One of the pigs is a runt, the other is bigger, but neither truly qualifies as fat for a pig.

(46a) could be both felicitous and true in this context, while (46b) would be false.

(46) a. The fat pig can talk to spiders.
b. The pig that can talk to spiders is fat (for a pig).

Absolute adjectives do not permit this sort of use. (47) involves a maximum standard adjective; (48) a minimum standard adjective.

CONTEXT: Two glasses of beer are on the table, one of which is half full and one of which is 2/3 full.

(47) a. #The full glass of beer is mine.
b. The fuller (of the two) glass(es) of beer is mine.

CONTEXT: Standing in front of two partially open doors, one that is barely open and one that most of the way open.

(48) a. #You should go through the open door.
b. You should go through the more open (of the two) door(s).

Assuming the standards for *full* and *open* are fixed at the maximum and minimum values of the respective scales (modulo imprecision), the existence and uniqueness presuppositions associated with the definite descriptions (that there is a full glass of beer/open door) are not satisfied.

3.2.3 Pretty

When the degree morpheme *pretty* modifies a relative adjective, it has a meaning very similar to *very*: it 'boosts' the value of whatever degree the context selects as a standard. (49a) thus entails (49b).

(49) a. The rod is pretty long.
b. The rod is long.

The same interpretation is observed with absolute limit adjectives that make use of minimum standards, such as *bent*:

(50) a. The rod is pretty bent.
b. The rod is bent.

In contrast, when *pretty* modifies an absolute adjective with a maximum standard, its interpretation is different, as pointed out by Unger (1975). (51a) means that the rod is nearly or almost straight, and entails the negation in (51b).

(51) a. The rod is pretty straight.
b. The rod is not straight.

Something to explore: The interpretation of *pretty much* as a modifier of verbs and deverbal adjectives.

3.2.4 Entailment Patterns

If the standards associated with absolute adjectives involve endpoints, then the denotations of the predicates they head should be as in (52).

(52) a. $[\![[_{\text{AP}}\ \text{adj}_{min}]]\!] = \lambda x.\exists d[d \succ min(S_{adj}) \wedge \mathbf{adj}(x) \succeq d]$ *min stnd*
b. $[\![[_{\text{AP}}\ \text{adj}_{max}]]\!] = \lambda x.\exists d[d = max(S_{adj}) \wedge \mathbf{adj}(x) \succeq d]$ *max stnd*

Let's assume for now that the domain restriction variable **C** is obligatorily set to the values in (52a) or (52b) for absolute adjectives. (Exactly how this is accomplished is the topic of the next class!)

According to (52a), *a is not* adj_{min} should entail that *a* posesses no amount *adj*-ness at all (assuming that the minimal degree on a closed scale represents a zero amount of the relevant property). This seems to be true:

(53) a. #My hands are not wet, but there is some moisture on them.
b. #The door isn't open, but it is ajar.

(53b) predicts that an assertion of *a is* adj_{max} should entail that *a* has a maximal amount of '*adj*-ness', i.e., that nothing can be more *adj* than *a*. This sort of entailment is difficult to test, because of imprecise uses, However, Unger (1975) points out that it is possible to force a precise interpretation by adding focal stress to the adjective:

(54) a. #My glass is FULL, but yours is fuller than mine.
b. #The line is STRAIGHT, but you can make it straighter.

The truth conditions for relative adjectives entail only that its argument falls above a contextually determined standard of comparison. As a result, neither of the entailments discussed above should hold:

(55) a. That film is interesting, but it could be more interesting.
b. Sam is not tall, but his height is normal for his age.

A related argument involving entailments (Cruse 1986; Rotstein and Winter 2001):

(56) a. The door is not open. $\models$ The door is closed.
b. The table is not wet. $\models$ The table is dry.
c. The baby is not awake. $\models$ The baby is asleep.

Both members of the pairs in (56) are absolute adjectives, but the positive adjectives impose minimum standards while the negative adjectives impose maximum standards. Since a minimal positive degree corresponds to a maximal negative degree on the same scale, the entailment relations in (56) follow.

Relative antonyms do not show the same entailment relations, as illustrated by (57).

(57) a. The door is not large. $\not\models$ The door is small.
b. The table is not expensive. $\not\models$ The table is inexpensive.
c. The baby is not energetic. $\not\models$ The baby is lethargic.

Since a context dependent standard is determined for particular uses of particular adjectives, it need not be the case that the standard for e.g. *large* be the same as that of its antonym *small*. We thus allow for the possibility of a 'grey area' between the standards onto which fall objects that are neither large nor small — borderline cases.

A version of the same entailment test can be used to determine whether the standard corresponds to the upper or lower end of a scale. If the standard is a maximal degree, then an affirmation such as *x is half/partially adj* entails that *x is not adj*:

(58) a. The plant is half dead. $\models$ The plant is not dead.
b. The glass is partially full. $\models$ The glass is not full.

For a minimum standard, such an affirmation entails that *x is adj*:

(59) a. The door is half open. $\models$ The door is open.
b. The table is partially wet. $\models$ The table is wet.

The conclusion to be drawn from the preceding array of facts is that there is a semantic distinction between gradable adjectives with absolute and relative standards. Even though the former have imprecise uses that sometimes make them appear superficially similar to relative adjectives, the data discussed here show that the absolute/relative distinction is in fact grammatically significant.

3.3 Relating scales and standards

The relation between scale structure and standard value can be summarized as follows:

(60) a. Gradable adjectives associated with totally open scales have relative standards.
b. Gradable adjectives that use totally or partially closed scales have absolute standards.

(60a) is exceptionless: since open scales lack endpoints, it is impossible for open scale adjectives to have endpoint standards.

(60b) is probably not exceptionless, but it does appear that the standards for closed-scale adjectives default to an endpoint of the scale: the minimum in some cases (e.g., *awake* and *open*); the maximum in others (e.g., *asleep* and *straight*).

- **NB:** There isn't a logically necessary reason why adjectives with closed scales should have absolute standards. The fact that we do get such a strong tendency in this direction should follow from something....

4 Degree Modification

We now return to the distribution of the degree modifiers *very, much* and *well* in adjectival participles. As we will see, the facts can be explained in terms of the two semantic features of gradable adjectives that we have been discussing: scale structure and the relative/absolute standard distinction.

4.1 Very

Roughly speaking, the difference between e.g. *expensive* and *very expensive* is that the latter denotes a property whose meaning is just like the former, except that the relative standard is boosted by some amount. (61) shows that the standard boosting effect of *very* (in terms of absolute increase of degree) depends on how high the initial standard is.

(61) a. The international space station is very expensive. (for space projects; *large increase in the standard*)
b. The coffee at the airport is very expensive. (for coffee; *smaller increase in the standard*)

This suggests a lexical entry for *very* along the lines of (62), where **high** is a context-dependent property of degrees of the form 'greater than the standard by a large degree'.

(62) $[\![very]\!] = \lambda G \lambda x . \exists d [\mathbf{high}(d) \wedge G(d)(x)]$

Clearly, **high** is a vague restriction on degrees, but the examples in (62) suggest that this is exactly what we want.

- Here it is worth thinking about how Klein would handle (61a) vs. (61b)

In normal usage, adjectives associated with *absolute* standards reject modification by *very*:

(63) a. ??They were very able to solve their own problems.
b. ??The door is very open.
c. ??That drug is currently very available.

As we saw last week, *dry* provides a particularly clear illustration of this restriction on *very*, since it has both relative and absolute uses.

When *dry* is used to describe a (more or less) permanent, stable property such as the average degree of moisture in the atmosphere, it can be modified by *very* and it accepts *for*-PPs:

(64) a. This region of the country is very dry.
b. This region of the country is dry for a temperate zone.

When *dry* describe a more transient sort of property like the amount of liquid on a surface, modification by *very* is impossible, and *for*-PPs are infelicitous:

(65) a. ??This part of the countertop is very dry.
b. ??This part of the countertop is dry for a cutting surface.

Bolinger (1972, pp. 38-39): the adjective modified by *very* must express an 'essential' rather than 'accidental' property.

(66) a. What we need is a man who is very able, very cheerful, and a good mixer. (Bolinger 1972, p. 39)
b. The department chair is very open to suggestions as to how to revamp the doctoral program.
c. She's is a very available person considering her busy schedule.
d. The baby is very awake. ($\neq$ wide awake)

Another 'exception': *very* can be interpreted in a way analagous to what we saw with *pretty* when it modifies a maximum standard absolute adjective: it may be construed as modifying an implicit (relative) *nearly*, so that *very A* means *very nearly A* (and so entails *not A*).

EXAMPLE: Consider a bar in which all the glasses are marked to indicate the level to which they are supposed to be filled with beer. In a situation where an inattentive bartender accidentally fills a glass past this 'full mark', it would be infelicitous for his accuracy-obsessed boss to object by saying (67a). Likewise, the lucky recipient of the overfull glass of beer cannot felicitously describe this situation with (67b).

(67) a. Hey! That glass is very full! Pour out some of that beer.
b. Wow! My glass is very full for a change!

So the bottom line is that *very* really does seem to require the gradable predicate it modifies to be relative. This suggests the following revised semantics for *very*:

(68) $[\![very]\!] = \lambda G : G \in A_{rel} \lambda x. \exists d[\mathbf{high}(d) \wedge G(d)(x)]$

This proposal presupposes and answer to the important question of how relative and absolute adjectives are distinguished from each other.....

If this proposal is correct, then we expect the class of deverbal gradable adjectives that accept modification by *very* to show properties of relative adjectives. This is true:

(69) a. Klaus was very pleased for someone with his generally dreary outlook on life.
b. Mike appeared very frightened for a supposedly invincible boxer.
c. For someone who had just been accused of embezzlement, Gil seemed very relaxed.

(70) a. Klaus wasn't pleased by the report, though he did find a few positive aspects to it.
b. Klaus was pleased by the report, though he could have been happier with it.

(71) a. Mike wasn't frightened when he entered the ring, though he did feel a bit of apprehension.
b. Mike was frightened when he entered the ring, though he wasn't petrified.

(72) a. Gil wasn't relaxed, though he wasn't very nervous, either.
b. Gil felt relaxed, though he could have been more so.

Does Klein's analysis of *very* provide a more explanatory account of its distribution?

(73) $[\![very\ A]\!]_c = [\![A]\!]_{c[X]}$, where X is the positive extension of A at c.

(74) $Dom(A) = a \prec b \prec c \prec d \prec e \prec f \prec g \prec h \prec i \prec j \prec k$
a. $pos(A) = \{g, h, i, j, k\}$
b. $neg(A) = \{a, b, c, d\}$
c. $gap(A) = \{e, f\}$

(75) $Dom(very\ A) = g \prec h \prec i \prec j \prec k$
a. $pos(very\ A) = \{j, k\}$
b. $neg(very\ A) = \{g, h\}$
c. $gap(very\ A) = \{i\}$

ASSUME: Absolute GAs lexically lexically specify what their positive extensions are:

- For minimum standard adjectives, the objects in their domains that have any amount of the property in question.
- For maximum standard adjectives, the objects in their domains that have a total amount of the property in question.

So, the relative/absolute distinction is a lexically specified distinction in how to partition the domain.

If this is the way things work, then *very* should not contribute any new information: *very* $A_a bs$ will be true of everything that $A_a bs$ is true of. Moreover, we would end up with a property whose negative extension is empty (since the domain of *very* $A_a bs$ is only the positive extension of $A_a bs$), so *very* $A_a bs$ would be inherently uninformative (tautologous) as well.

Recall however that for Klein 'having x amount of some property' is not actually part of the semantics, but evidently part of some other cognitive system.

4.2 Much

We claim that *much* has the same sort of meaning as *very*, except that it is constrained to modify only absolute adjectives:

(76) $[\![much]\!] = \lambda G : G \in A_{abs} \lambda x. \exists d[\mathbf{high}(d) \wedge G(d)(x)]$

This analysis is most clearly supported by the distributional properties of *much* as a modifier of deverbal gradable adjectives.

(76) predicts that *much* is compatible only with absolute gradable predicates that make use of minimum standards: maximum standards cannot be boosted, so modification of a maximum standard adjective by *much* should be either undefined or vacuous.

(77) shows that the participles that accept *much*-modification have minimum standards.

(77) a. #The war was not desired, but certain parties hoped that a conflict would break out.
b. #Your financial support is not needed, but it is necessary that we get small contribution from you.
c. #The film was not praised, but one critic said good things about it.
d. #The problem was not talked about, though Frank mentioned it to his mother.

Deverbal adjectives with maximum standards do not accept modification by *much*:

(78) a. ??The meat is much done. (cp. partly done $\not\models$ done)
b. ??The book is much written. (cp. half written $\not\models$ written)
c. ??The glass is much filled. (cp. partially filled $\not\models$ filled)

Nor do adjectives with relative standards, as seen in the incompatibility of *much* modification with a *for*-PP that indicates comparison class:

(79) a. ??Klaus was much pleased for someone with his generally dreary outlook on life.
b. ??Mike appeared much frightened for a supposedly invincible boxer.
c. ??For someone who had just been accused of embezzlement, Gil seemed much relaxed.

Note that *much* should in principle be compatible both with totally closed and lower closed scale adjectives. It is is clearly compatible the latter:

(80) a. ??a completely needed expense
b. ??a completely desired result
c. ??a completely discussed issue

It is less clear to what extent *much* is compatible with the former. One possible example:

(81) ...a much-deserved rest (cf. fully deserved) [Commissioner Gordon, at the end of *Batman* episode 'Surf's Up/Joker's Under']

An 'elsewhere effect' imposed by *well*? Or evidence that *much* is sensitive to scale type also...?

It should also be acknowledged that *much* also differs from *very* in that it is more often than not infelicitous with underived adjectives, even if they satisfy the absolute adjective/minimum standard requirement (cf. Bolinger 1972):

(82) a. ??much {wet, open, dirty}
b. ??much {aware of the difficulties, able to cope, available}

A purely morpho-syntactic constraint or something indicative of a deeper semantic difference between derived and underived adjectives?

Something else to keep in mind is that comparatives are compatible with *much*-modification independent of the relative/absolute distinction:

(83) a. much {wetter, more open, dirtier, etc.}
b. much {drier, more closed, cleaner, etc.}
c. much {taller, happier, more expensive, etc.}

This may actually follow from the semantics we have proposed in (76)!

Suppose that the denotation of e.g. *more* is something like (84), which differs in form from a standard degree morpheme meaning in selecting for an extra degree argument — the one corresponding to the comparative clause.

(84) $[\![\text{more}]\!] = \lambda G \lambda d \lambda x . \exists d' [d' \succ d \wedge G(d')(x)]$

If this is right, the interpretation of e.g. *more expensive* is as shown in (85), which is an expression of the same semantic type as an ordinary gradable adjective, and so could in principle combine with *much*.

(85) $[\![\text{more expensive}]\!] = \lambda d \lambda x . \exists d' [d' \succ d \wedge \mathbf{expensive}(x) \succeq d']$

If we make the further assumption that comparatives are 'derived' absolute gradable predicates — an assumption justifiable when we consider the behavior of comparative forms with respect to the tests for absolute vs. relative standards in 3.2 — then *more expensive* also satisfies the selectional restrictions of *much*, giving us (86) as the interpretation of *much more expensive*.

(86) $[\![\text{much more expensive}]\!] = \lambda x . \exists d'' [\mathbf{high}(d'') \wedge \exists d' [d' \succ d'' \wedge \mathbf{expensive}(x) \succeq d']]$

In prose: *much more expensive* is true of an object iff there is a degree d'' that is appropriately higher than the standard for *more expensive* (the degree introduced by the comparative clause) and a degree d' that exceeds d'', and the degree to which object is expensive is at least as great as d'.

As it stands, however, this analysis leaves unresolved how exactly the comparative clause is compositionally incorporated into the interpretation of the adjective phrase as a whole....

Perhaps we should consider an alternative proposal should be considered on which *much* modifies *more* alone?

How would Klein handle *much*?

I'm not sure — certainly we can't tell the same story we told for *very*, or we'd make the wrong predictions. As far as I can tell, Klein would have to say that *much* overrides an absolute adjective's lexical specifications about what its positive extension is, so that it can partition the original positive extension of the adjective to derived positive and negative extensions. This would sort of undermine the analysis of *very*, however....

4.3 Well

In contrast to *very*, *well* combines felicitously with adjectives that have totally closed scales, but not with adjectives that have open scales:

(87) a. We are well aware of the difficulties.
b. They are well able to solve their own problems.
c. The bud was well open. (Bolinger 1972, p. 43)

(88) a. We are partially/half/completely aware of the difficulties.
b. They are partially/half/completely able to solve their own problems.
c. The bud was partially/half/completely open.

Participles that accept modification by *well* also have closed scales:

(89) a. well {acquainted, documented, understood, publicized, written, etc.}
b. partially/half/completely {acquainted, documented, understood, publicized, written, etc.}

Note also that the output of *well*-modification can be the input to a full range of further degree modification:

(90) a. They remained very/quite/only too/hardly well aware of the difficulties that might arise from their analysis.
b. Martin Beck is very well acquainted with the facts of the case.
c. The facts are hardly well understood.
d. The concert was quite well publicized.

The facts in (90) suggest that *well* denotes a function from GA meanings to GA meanings. What kind of function? Four facts are relevant to answering this question.

1. the output of *well* modification supports degree modification by *very* shows that the resulting complex expression must be a relative gradable predicate.

2. Although a *well A* construction can be further modified by a range of degree morphemes, there is a systematic exception: proportional modification is infelicitous, as shown by (91), indicating that the *well A* complex uses an open scale.

(91) a. ??Martin Beck is partially/half/completely well acquainted with the facts.
b. ??The concert was partially/half/completely well publicized.
c. ??The facts are partially/half/completely well understood.

3. An utterance of *x is well A* presupposes that *x is A*:

(92) a. Martin Beck is well acquainted with the facts.

b. Is Martin Beck well acquainted with the facts?
c. Martin Beck is not well acquainted with the facts.
d. Martin Beck is acquainted with the facts.

4. There is a clear semantic relation between the degree modifier use of *well* and its adverbial use, as illustrated by the examples in (93).

(93) a. We acquainted Beck well with the facts.
b. Beck is someone well acquainted with the facts.

If a person is well acquainted with a set of facts, then it is also true that that person has been acquainted well with those facts.

With these considerations in mind, we will propose an interpretation of *well* in terms of the meaning of the open scale, relative adjective *good*, which we assume underlies *well*.

The basic idea: *well* takes a closed scale gradable predicate G as input and returns a relation between an object x in the positive extension of G (an object that is G) and a degree d such that there is an event related to G with participant x and the degree to which the event is good is at least as great as d.

(94) $[\![\text{well}]\!] = \lambda G : S_G \textit{ is closed}.\lambda d \lambda x : x \textit{ is } G.\exists e[G^v(x)(e) \wedge \mathbf{good}(e) \succeq d]$

In (94), G^v is an abbreviation for an event description related to G, which we take to be specified in G's fine-grained lexical representation.

(95) Beck is well acquainted with the facts of the case.

(95) presupposes that Beck is acquainted with the facts (and has therefore been the acquaintee in an acquainting event), and is true if the acquainting event qualifies as good, perhaps because it was very thoroughly carried out.

Obviously, more needs to be said here, but we have one good prediction: since there are various ways in which an eventuality might count as good, we should see a certain amount of polysemy in *well* modification. We've already seen that this is true.

(96) a. Well-documented, yet little known facts about dams and reservoirs
(http://www.sandelman.ottawa.on.ca/dams/readme.html)
b. Well documented patterns reduce future labour
(http://www.expressitpeople.com/20011119/management3.htm)

The point of the first article is that there is a large volume of information about the harmful effects of large dam and reservoir projects outside of the narrow domain of engineering literature (which is typically ignored); *well* is clearly being used here to indicate a high degree of documentation. The second article is a discussion of pattern-oriented methodologies in software development. It argues that such a methodology will be successful only if the relevant patterns are carefully documented; here *well* has a manner interpretation.

But what about the cases where one reading disappears?

(97) a. The book was well written.
b. The house was well built.

(98) a. Olive was well prepared for her talk.
b. Olive's talk was well prepared.

The descriptive generalization: A degree reading of *well* is possible only if the modified adjective uses a minimum standard.

That this should be so is clear: if *x is well A* presupposes that *x* is *A*, and *A* is a maximum standard adjective, then a degree-boosting interpretation of *well* should be impossible (you can't boost a maximum degree).

The question that needs to be answered now is what determines whether a derived adjective has a minimum or maximum standard. We'll come back to this below.

4.4 Interim conclusions

1. Scale structure is important.
2. Standard of comparison (the relative/absolute distinction) is important.
3. Both need to be somehow encoded in (or derived from) gradable predicate meanings.

5 The origins of scales and standards

Now we have some new questions:

- How is the scale structure of a gradable predicate determined?
- Is it possible to predict whether a particular derived adjective will be associated with an open or closed scale, and to predict what sort of standard value will it use?

We're going to argue for the following answers:

- The scale structure of a derived adjective can be predicted based on the event structure associated of the source verb or the boundedness of its argument (cf. Paradis 2001).
- The orientation of an absolute standard — whether it is maximum or minimum — also depends on properties of the aspectual and argument structure of the source verb.

5.1 Predicting the scale structure of derived adjectives

5.1.1 Building closed scales

The data that we have observed indicate that the class of deverbal adjectives with totally closed scales corresponds very closely to the class of verbs that introduce incremental arguments.

(99) *"Classic" incremental theme arguments*
a. half eaten cookies
b. a partially written novel
c. a fully paid bill
d. a half prepared talk
e. a completely severed connection

(100) $Pat_{+/-}$ *arguments* (Ramchand 1997)

a. partially documented allegations
b. an individual fully acquainted with the facts
c. fully straightened teeth
d. partially frozen liquid
e. a completely covered terrace

(101) Ramchand's Pat_{LOC} *arguments* (Ramchand 1997)
a. a partially crossed desert
b. a half descended staircase
c. fully raised blinds
d. a completely traversed distance

What is special about this class of verbs is that it is possible to establish a homomorphic relationship between the events they denote and their incremental arguments (Krifka (1989, 1992); see also Dowty 1991; Tenny 1995; Jackendoff 1996; Ramchand 1997):

(102) *Mapping to Objects* (Krifka 1989, p. 92)
$\forall R[\mathbf{MAP\text{-}O}(R) \leftrightarrow \forall e \forall e' \forall x[R(e,x) \wedge e' \subseteq_E e \rightarrow \exists x'[x' \subseteq_O x \wedge R(e',x')]]]$

All subevents e' of a given event e with participant x in role R (the 'incremental theme' role) involve a part x' of x.

OUR HYPOTHESIS: Adjectival participles derived from verbs that satisfy (102) have scales with minimal and maximal values defined as follows:

- The minimal degree on the scale represents participation in a minimal (sub)event of the appropriate sort by (a minimal part of) the incremental theme/property/path.
- The maximal degree on the scale represents participation in the maximal event involving (all of) the incremental theme/property/path.

An important distinction: Note that the *derived* measure function expressed by an adjective derived from an incremental verb, which measures the degree to which an object has participated in the event described by the verb, must be distinguished from any adjectival component of the lexical semantics of the verb itself.

For example, the verb *load* includes as part of its meaning a function that measures the degree to which the incremental argument has been filled with stuff, i.e., an adjectival component whose meaning is very similar to *full*. This measure is distinct from that expressed by the adjectival participle *loaded*, however, as illustrated by the differences in meaning between the sentences in (103) and (104).

(103) a. Kim's truck is partially loaded.
b. Kim's truck is half loaded.
c. Kim's truck is 80% loaded.
d. Kim's truck is completely loaded.

(104) a. Kim's truck is partially full.
b. Kim's truck is half full.
c. Kim's truck is 80% full.
d. Kim's truck is completely full.

Crucially, the degree to which any particular truck is loaded need not be identical to the degree to which it is full. (103d), for example, does not entail (104d):

(105) Kim's truck is completely loaded (with the hay), but it is not full.

5.1.2 Building partially closed scales

If the scale structure of adjectives derived from atelic verbs shows the same sort of relation to the source verb's event structure that we saw for telic verbs, then we expect to find that such adjectives have *partially* closed scales:

- The minimal (sub)event or state which supports the truthful application of the adjectival property to its argument will map onto the lower endpoint of the scale.
- Progressively larger subevents will map onto progressively higher points on the scale.
- However, since atelic verbs describe situations with no natural endpoint, there will be no obvious *maximal* event or state which could correspond to an upper endpoint of the corresponding adjectival scale.

The scale should thus be open on the upper end.

(106) *Adjectives derived from atelic verbs*
- a. a much admired statesman
- b. much needed rain
- c. a much regretted action
- d. a much praised piece of work
- e. a much looked for treasure
- f. a much talked about program
- g. a much despised neighbor

What exactly do these adjectival participles measure? There is some degree of indeterminacy here in the relevant dimension:

(107)
- a. duration: *needed for a long time*
- b. frequency: *talked about many times*
- c. popularity: *admired by many people*
- d. intensity: *despised to a high degree*

In all cases, though, the scale is built as described above.

An interesting prediction: The proposal we have made about the mapping between event structure and scale structure seems to make the following prediction:

- No adjective derived from an eventive verb should be associated with a scale which is open on the *lower* end.

This is because there should always be a minimal event which supports the truth of the adjectival predication and which will provide a basis for a lower bound on the scale.

Possible evidence that this prediction is correct: to the best of our knowledge, all deverbal adjectives prefixed with *un-*, which reverses the polarity of the adjective scale, accept modification by endpoint-oriented modifiers such as *absolutely* (see 3.1, above).

5.1.3 Bounded arguments, bounded scales

An apparent counterexample: *known*, a stative, hence atelic, verb which evidently has a closed scale:

(108) The effects of that drug are not fully known.

One possible response: The scale structure of *known* is based on an implicit event of 'coming to know', which has as its culmination the state described by the verb.

Another possible response: The extension of the adjective's argument can provide the basis for building a closed scale for such adjectives.

If, for example, an object x is partially known, then one or more individuals stand in a knowing relation to at least some part of x; if x is fully known, then one or more individuals stand in a knowing relation to all parts of x; and so on.

There is some evidence that we can take the second strategy independently. First, not only participles but also non-deverbal adjectives typically associated with unbounded scales come to be associated with bounded scales when combined with the right kind of argument.

(109) a. ??Outside it's completely hot.
b. The baby's face is completely hot.

(110) a. ??Milk is completely white.
b. His suit was completely white.

Second, examples like the following are ambiguous:

(111) a. The meat is half cooked.
b. The crops are partially frozen.

(111a) can be understood as entailing that all of the meat is half cooked, but it also can be true in situations in which half of the meat is entirely cooked. (Though is this just *Half the meat is cooked*?)

More work needs to be done here.

5.2 Predicting the orientation of absolute standards

The data suggest that in the case of deverbal adjectives, the orientation of the standard depends on the role of the adjective's argument in the event associated with the source verb:

- Adjectives whose arguments are incremental themes of the source verbs systematically have upper endpoints as standards.
- Adjectives whose arguments correspond to non-incremental themes have lower endpoints as standards.

(112) a. The grass is half cut.
b. Half of the grass is cut.
c. The grass is not cut.

(113) a. Beck is partially acquainted with the facts.
b. ??Part of Beck is acquainted with the facts.
c. Beck is acquainted with the facts.

The explanation for these correlations can be traced to the relationship between the truth conditions for the adjective and those for the related verbal predication.

- For IT arguments, it cannot be asserted that the eventuality corresponding to the participle is completed until the argument has been totally affected (in the relevant way). It follows that an adjectival participle truthfully applies to such an argument only if that argument possesses a maximal amount of the relevant (deverbal) property, which measures progress through the event.
- For non ITs, the completion of the corresponding eventuality does not depend on affecting all of the argument (or affecting that argument in its entirety). It is therefore possible that the eventuality may be completed even when that argument has been minimally affected, in which case the adjectival participle may be applied to such an argument even if it possesses only a minimal degree of the relevant property.

This also allows for the possibility that some non-IT arguments may end up with relative standards, though we shouldn't expect this for IT arguments.

(114) a. Olive is well prepared for her talk.
b. Olive's talk is well prepared.

(115) a. Olive is partially prepared for her talk. $\not\Rightarrow$ Olive is prepared for her talk.
b. Olive is prepared for her talk, though she could be more prepared than she is.

(116) a. Olive's talk is partially prepared. $\Rightarrow$ Olive's talk is not prepared.
b. #Olive's talk is prepared, but it could be more prepared than it is.

(117) a. Olive is very prepared for her talk.
b. ??Olive is much prepared for her talk.

How do our claims about the orientation of an absolute standard for deverbal adjectives (if correct) carry over to underived absolute adjectives?

Here it would probably be a good idea to take another look at Yoon's (1996) characterization of 'total' vs. 'partial' predicates (see also Rotstein and Winter 2001 for a more recent discussion of this in terms of some of the principles of scale structure outlined here).

(118) a. clean/dirty
b. closed/open
c. dry/wet
d. asleep/awake
e. straight/bent
f. dangerous/safe

6 Final thoughts

In addition to the question asked at the end of the last section — to what extent can the orientation of the standard can be predicted in cases of adjectives not obviously related to events — there are many other issues remaining to be explored. Here are a few:

- What about other degree modifiers? There are many more which merit investigation, and it remains to generalize the semantics provided here for *much* and *well* to uses as degree modifiers of other syntactic categories.
- How should scale structure should be encoded in the lexical semantic representations of members of different grammatical categories? At the very least, lexical entries should be structured to allow us to explain the influence that (both linguistic and extralinguistic) context can have on the scale with respect to which an adjective is evaluated, and they should also make clear how the scale structures of derivationally-related expressions (verbs and deverbal adjectives, for instance) are related.
- What does all this say more generally about the role of scalar representations in semantics? The facts we have discussed here clearly reinforce hypotheses put forward by Bolinger and Sapir that gradability is a feature of grammatical categories other than adjectives; future research should be directed towards increasing our understanding of the general semantic functions of this feature.

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