

SCALE STRUCTURE, DEGREE MODIFICATION AND THE SEMANTICS OF GRADABLE PREDICATES

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In this paper we develop a semantic typology of gradable predicates, with special emphasis on deverbal adjectives. We argue for the linguistic relevance of this typology by demonstrating that the distribution and interpretation of degree modifiers is sensitive to its two major classificatory parameters: (1) whether a gradable predicate is associated with what we call an OPEN or CLOSED scale and (2) whether the standard of comparison for the applicability of the predicate is ABSOLUTE or RELATIVE to a context. We further show that the classification of an important subclass of adjectives within the typology is largely predictable. Specifically, the scale structure of a deverbal gradable adjective correlates either with the algebraic part structure of the event denoted by its source verb or with the part structure of the entities to which the adjective applies. These correlations underscore the fact that gradability is characteristic not only of adjectives but also of verbs and nouns, and that scalar properties are shared by categorially distinct but derivationally-related expressions.*

1. DEGREE MODIFICATION IN DEVERBAL GRADABLE ADJECTIVES Among the many observations made in Bolinger's (1972) classic study of degree expressions in English, two stand out. First, degree modifiers in English have distributions which cannot be given a purely syntactic explanation. Consider, for example, the behavior of *well*, *much* and *very*. At a superficial level, these three modifiers 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. In (1), for example, the addition of the degree modifiers increases the degree to which the properties are claimed to hold of their respective subjects in roughly the same way.

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- (1)
 - a. Martin 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.

Despite these similarities, however, according to our intuitions and those of other speakers we have consulted, 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*):¹

- (2)
 - a. Beck is well/??very/??much acquainted with the facts of the case.
 - b. We'll be surrounded by dozens of people – you'll be well/??very/??much protected.
 - c. By the time it reached the Manchester Palace, it had become a well/??very/??much documented tour.
 - d. But that was no longer true at election time: as the election approached, the highly educated became less interested, and those who were not well/??very/??much educated became more interested.
- (3)
 - a. But the heavy rain has been welcomed by the British Waterways, as a much/??well/??very needed boost for its canals and reservoirs which have been kept low during this year's long, hot summer.
 - b. When the results for beech trees were disclosed, they were nearly identical to the much/??well/??very criticised FoE survey of 1985.
 - c. Even at the then much/??well/??very praised Alfort school, their four-year course was considered to be too long.
 - d. Fortunately, with much/??well/??very appreciated financial help...the workshop was organised and held successfully.
- (4)
 - a. A very/??well/??much surprised face peered out of the window.
 - b. Kim was very/??well/??much worried by the diagnosis.
 - c. Ron Weasley is very/??well/??much frightened of spiders.
 - d. "We have people very/??well/??much interested in the site," he told the committee.

These judgments are mirrored by distributional asymmetries in corpus data, as illustrated by the numbers in Table 1. These counts are from the first edition of the British National Corpus (<http://info.ox.ac.uk/bnc>), and reflect the number of hits in a search of approximately 100 million words. While the distributions are not absolutely complementary (a fact about which we have more to say in section 6), the

¹Throughout this paper, ?? is used to mark examples which, according to our intuitions, are not felicitous. The source of this infelicity in examples like (2)-(4) on our analysis, as will become clear below, is a violation of the selectional restrictions imposed by the degree modifier on the adjectives it modifies. We use # to indicate that an example is contradictory, while ungrammaticality is marked, as usual, by *.

contrasts are striking:

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

	<i>well</i>	<i>very</i>	<i>much</i>
acquainted	56	0	0
protected	58	2	0
documented	213	0	1
educated	78	3	0
needed	2	0	211
criticised	0	0	19
praised	1	0	17
appreciated	12	0	124
surprised	0	151	1
worried	0	192	0
frightened	0	92	0
interested	0	335	10

A first hypothesis to explain these facts, or at least the unacceptability of *very* in (2)-(3), would be that these participles are either not adjectives or are not gradable. As shown by the examples in (5) and (6), *very* is restricted to modifying expressions that are both adjectives and gradable. The modifier *much* also requires its argument to be gradable (Doetjes 1997), though it does not show the same sorts of categorial restrictions.

- (5) a. *He is very a boy/a very boy. (cp. He is very much of a boy.)
 b. *That candidate is very to the left of the center. (cp. That candidate is very far/well to the left of the center.)
- (6) a. ??That bomb is very atomic.
 b. ??Richard Nixon, a very former president, resigned before he was impeached.

This hypothesis cannot be correct, however. First, the facts in (7) show that many participles that do not co-occur with *very* allow negative *un*-prefixation, a property of adjectives but not verbs.

- (7) a. unacquainted, unprotected, undocumented, uneducated
 b. unneeded, uncriticised, unpraised, unappreciated

Second, they can appear as complements to copular verbs such as *seem*, *feel* or *become*, yet another property of adjectives but not verbs.

- (8)
- a. I *became acquainted* with her brother Pavel Sergeevich Popov, a university professor.
 - b. And in the delirium of recognising her power she *felt protected*, safe in his arms.
 - c. Second, this cladogram is an exercise in inference because many of the extinct groups *remain poorly documented*...
 - d. An alternative to the traditional means of funding social services *seems needed*.
 - e. But Louisa...grew up with a very unreal need to *feel praised* and fted for her looks....
 - f. However, as the role of radioactive decay in generating heat in the Earth's interior *became appreciated*, the notion of a contracting Earth was rejected.

Finally, the fact that these participles are gradable is shown by their appearance in comparative constructions, a property that holds only of gradable predicates. This is illustrated by the corpus data in (9).

- (9)
- 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 darker your skin, the *more protected* it is....
 - c. Except for the Baptists, the influx did not lower the trend towards a *more educated* ministry: the total of all Baptist ministers without any formal higher education was only eighteen percent by 1901.
 - d. Not surprisingly one finds a greater number of narratives of the miracles of dead saints in France than in Germany, because they were *more needed* there.
 - e. I think there is still unfortunately a need for women to do that; I think they're often *more criticised*, especially in environments where there are fewer of them and where historically there have been fewer.
 - f. It seems that staff often feel *less appreciated* than in fact they are by parents, and probably vice versa.

We therefore conclude that the facts in (2)-(4) can be explained neither in terms of a category mismatch nor in terms of the non-gradability of the predicate: these deverbal expressions are gradable adjectives (see Borer 1998, pp. 92–93, for the same conclusion).

Bolinger's second important observation, which echoes an earlier point made by Sapir (1944), is the obvious but mostly neglected fact that gradability is a property not just of adjectives, but of nouns, verbs, adverbs, and prepositions as well (though see Doetjes 1997; Kennedy and McNally 1999; Hay, Kennedy, and Levin 1999; Tsujimura 2001; Vanden Wyngaerd 2001; Paradis 2001; Wechsler 2002 for examples of recent work exploring these connections). Given the fact that the adjectival expressions we are interested in here are derived from (or related to) verbs, we should ask whether there is some regular correspondence between aspects of verb meaning and aspects of adjective meaning. In particular: are there underlying similarities in the kind of gradability they manifest? Put another way, is it accidental that the various participles in (2)-(4) show the behavior that they do, or does some property of the source verb determine the behavior of the adjectival form with respect to degree modification?

The purpose of this paper is twofold. First, we use the distribution of degree modifiers as a departure point for developing a semantic analysis of gradable predicates that supports a typology parameterized along two core features. The first is the structure of the scale that a gradable property uses as a basis for ordering the objects in its domain (cf. Rotstein and Winter to appear), in particular, whether the scale is fully closed (has a minimum and maximum value), partly closed (has only a minimum or maximum value, but not both), or fully open (has no minimum or maximum value). The second feature is the nature of the STANDARD OF COMPARISON with respect to which a particular use of a gradable property is evaluated: put roughly, whether it is fixed contextually (as with an adjective like *tall*, which may be true of an object in one context and false in another), or whether it is determined without reference to context (as in the case of *empty*, which simply requires its argument to be devoid of contents). The fact that degree modifiers are sensitive to these features argues for encoding them in the lexical semantics of gradable expressions.²

Our second goal in this paper is to demonstrate that the scalar properties of gradable expressions are largely predictable from properties of the events to which they are related or of the individuals to which they apply. This result reinforces the larger claim advanced by Bolinger and Sapir: gradability is a fundamentally important semantic property, whose influence extends beyond adjectives to other lexical categories. The generality of scale structure, its importance for a wide range of linguistic phenomena, and the relative simplicity of the typology of scales that we develop thus justify a prominent place for scale structure in natural language semantics.

²Paradis (2001) also provides a number of empirical arguments that the distribution of degree modifiers correlates with the scalar properties of gradable adjectives, though she does not develop a semantic analysis of modifiers or a formal characterization of adjectival scale structure to account for these facts.

2. THE SEMANTIC TYPE OF GRADABLE PREDICATES We begin by laying out our basic assumptions about the semantic analysis of gradable adjectives. A well-known property of predicative uses of gradable adjectives like *tall* and *expensive* is that their interpretations are context dependent: what counts as tall or expensive may vary from context to context. One way to account for this variation is to characterize the truth conditions of such predicates in terms of a contextually defined standard of comparison, as in (10) (see e.g., Sapir 1944; McConnell-Ginet 1973; Bartsch and Vennemann 1973; Kamp 1975; Lewis 1979; Klein 1980, 1991; Bierwisch 1989; Ludlow 1989; Kennedy 1999b; Graff 2000 and many others)

- (10) a. Michael Jordan is tall.
b. The Mars Pathfinder mission was expensive.
- (11) a. Michael Jordan's height is at least as great as a standard of tallness.
b. The cost of the Mars Pathfinder mission was at least as great as a standard of expensiveness.

The standard of comparison is itself determined relative to a COMPARISON CLASS of objects that are similar in some way to whatever is being discussed (see Klein 1980 for discussion); the result is that the truth conditions of sentences like those in (10) may vary. For example, in a conversation about the cost of various missions to outer space, the comparison class for *expensive* might include many things that are quite a bit more expensive than the Mars Pathfinder mission. (One of the successes of the Pathfinder mission was that its cost was relatively low.) If the standard of comparison is set correspondingly high, then (10b) is false. In contrast, in a discussion about things with the name 'Pathfinder', the comparison class might include compasses, mountain bikes, and sport utility vehicles, as well as missions to Mars. The standard of comparison should therefore be quite a bit lower, and (10b) may be true.

There are different ways in which this basic analysis can be implemented. The approach that we assume here is one in which gradable adjectives map their arguments onto abstract representations of measurement, or DEGREES, which are formalized as points or intervals totally ordered along some DIMENSION (e.g., height, cost, etc.; we provide a more detailed account below). The set of ordered degrees corresponds to a SCALE, and propositions constructed out of gradable adjectives define relations between degrees on a scale with truth conditions analogous to the paraphrases in (11). (See Kennedy 1999a,b for an overview of scalar analyses of gradable adjectives and for arguments that a scalar approach is empirically superior to analyses that do not make use of scales or degrees.)

For the semantic type of gradable adjectives, we follow a well-established tradition and analyze them as relations between individuals and degrees (see Seuren 1973; Cresswell 1977; Hellan 1981; von Stechow 1984a; Heim 1985; Bierwisch 1989; Klein 1991; Kennedy 1999b and others). Specifically, a gradable adjective

like *expensive* has the denotation in (12), where d comes from the domain of degrees, x from the domain of individuals, and **expensive** is a measure function that maps its argument onto the scale associated with the adjective, in this case a scale of cost.³

$$(12) \quad \llbracket [_{\text{A}} \text{expensive}] \rrbracket = \lambda d \lambda x. \mathbf{expensive}(x) \succeq d$$

The adjective *expensive* thus denotes a relation between objects x and degrees of cost d such that the cost of x is at least as great as d .

In this type of approach, the value of the degree argument is determined by degree morphology — in English, comparatives, degree modifiers, and measure phrases. Comparative morphemes, for example, are analyzed as quantifiers over degrees. (See e.g. Heim 2000; we discuss the semantics of degree modifiers in detail in section 6.1 below.) For predicates formed out of unmodified gradable adjectives, such as those in (10), we assume that the degree argument is bound by a default existential quantifier with an unspecified restriction **C**, as shown in (13).

$$(13) \quad \llbracket [_{\text{AP}} \text{expensive}] \rrbracket = \lambda x. \exists d [\mathbf{C}(d) \wedge \mathbf{expensive}(x) \succeq d]$$

The domain restriction variable **C** determines the standard of comparison — in this case, the ‘cutoff point’ for things that are definitely *expensive* — by defining an appropriate property of degrees, e.g. the property of being significantly greater than some norm for some comparison class (cf. Bierwisch 1989; Graff 2000), or the property of being greater than average for some comparison class (cf. Cresswell 1977; Klein 1991), etc. Assuming that the value of **C** is fixed contextually, like other implicit quantifier domain restrictions (see von Stechow 1994; Stanley 2000, 2002), the standard of comparison is allowed to vary across different contexts of use. The result is that sentences like those in (10) may be true in some situations and false in others, which is exactly what we want.⁴

³Kennedy (1999a,b) argues for a compositional analysis in which the measure function is actually the denotation of the adjective itself, rather than a subpart of the adjective meaning (see also Bartsch and Vennemann 1973). Properties of individuals are built on top of measure functions through the addition of (possibly phonologically null) degree morphemes, which contribute an ordering relation and a standard degree to the adjectival predicate. Particular degree morphemes, which in English include comparative morphemes and the majority of degree modifiers, differ in the type of ordering relation they impose and in the properties of the standard degree that they introduce, but the end result of combining degree morphology with a gradable adjective is a property of individuals that is characterized as a relation between two degrees — i.e., an expression of the same semantic type as an adjectival predicate on the traditional analysis. Since the proposals we make in this paper do not crucially rely on one of these two analyses, we adopt the more familiar relational analysis of gradable adjectives.

⁴We assume a default existential quantifier in unmodified adjectival predicates — introduced by whatever mechanisms handle implicit arguments in general — primarily for convenience. Alternatively, we could follow von Stechow (1984a), who posits a null degree morpheme *pos* with the semantics in (ia) (see also Cresswell 1977). Composition of *pos* and *expensive* (which he treats as denoting a measure function) gives (ib), which is essentially the same as (13).

Much of the research cited above has been directed towards demonstrating that the assumptions outlined here provide a framework for handling the vagueness of sentences like (10b), as well as more complex constructions involving various kinds of degree morphology. Our focus in this paper is on a different set of questions: What exactly are the scales associated with gradable adjectives like? How might they vary? Is the standard of comparison for an adjectival predicate always determined in the same way? Can an adjective be associated with more than one type of scale? What factors determine the sort of scale a given adjective uses? In the following sections, we offer preliminary answers to these questions.

We begin in section 3 by identifying and providing evidence for one crucial structural property of scales: whether they have minimal and maximal elements. In section 4, we show that this property correlates to a large degree with the way in which the standard of comparison is determined, and in section 5, we consider in further detail some of the factors which determine the type of scale and standard value with respect to which an adjective is interpreted. Finally, in section 6, we show that both the nature of the scale and that of the standard of comparison play a crucial role in the analysis of the degree modifiers *very*, *much* and *well*.

3. SCALE STRUCTURE Adjectival scales have three crucial parameters, each of which must be specified in the lexical entry of any particular gradable adjective: a set of DEGREES, which represent measurement values; a DIMENSION, which indicates the kind of measurement (*cost*, *temperature*, *speed*, *volume*, *height*, and so forth); and an ORDERING RELATION. This means that scales may in principle be distinguished from each other — with linguistic consequences — in three different ways: in terms of properties of the set of degrees, in terms of the dimension, or in terms of the ordering relation.

A large body of research has established the linguistic significance of the latter two parameters. The ordering relation is the crucial factor distinguishing between antonym pairs like *tall/short*, *empty/full*, *expensive/inexpensive*, *accurate/in-*

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- (i) a. $\llbracket pos \rrbracket = \lambda G \lambda x. \exists d [d \text{ is greater than average} \wedge G(d)(x)]$
 b. $\llbracket pos \rrbracket(\llbracket expensive \rrbracket) = \lambda x. \exists d [d \text{ is greater than average} \wedge \mathbf{expensive}(x) \succeq d]$

Our analysis differs from von Stechow's in assuming a contextual domain restriction on the degree quantifier, but is otherwise completely comparable, and we assume interpretations of degree modifiers below that are completely analogous to (ia).

A common alternative to these two approaches is to analyze the standard of comparison as a designated free variable d_c , as shown in (ii), whose value is set to the relevant standard of comparison for the context of utterance by a DELINEATION FUNCTION provided by the model (see Lewis 1979; Barker 2002).

- (ii) $\llbracket [_{AP} \text{ expensive}] \rrbracket = \lambda x. \mathbf{expensive}(x) \succeq d_c$

A complete discussion of the issues surrounding a choice between the two versions of the domain restriction analysis and the 'free variable analysis' in (ii) goes beyond the scope of this paper, and since this choice is not crucial to our main points, we leave it aside.

accurate, *pure/impure* and so forth, which crucially make use of the same degrees and dimension (e.g., both *tall* and *short* map their arguments onto corresponding degrees of height) but express inverse ordering relations. This distinction has a number of well-known empirical reflexes, including markedness, the acceptability of measure phrases, and entailment patterns, and explains why examples like (14) are tautologous (see e.g. Seuren 1978; von Stechow 1984b; Cruse 1986; Rullmann 1995; Kennedy 2001).

- (14) 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 dimensional parameter, on the other hand, is the primary feature that distinguishes (non-antonymous) gradable adjectives from each other: *tall* and *flexible* both express orderings, but the first involves an ordering with respect to height (or perhaps something more abstract, like *linear extent*) and the second an ordering with respect to flexibility. One empirical reflex of this distinction is the phenomenon of incommensurability (see Klein 1991; Kennedy 1999b). As shown by the examples in (15), it is possible to construct (possibly quite complex) comparisons out of distinct gradable adjectives as long as they map their arguments onto scales that share the same ordering relation. Thus *wide* and *tall* in (15a) both involve orderings along a dimension of linear extent, and *long* and *old* in (15b) both involve orderings with respect to temporal extent.⁵

- (15) 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)

In contrast, comparatives formed out of adjectives that do not use the same ordering relation are anomalous:

- (16) 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.

This follows if different dimensions entail different scales, and if comparative morphemes presuppose that the degrees they order come from the same scale (see Kennedy 2001 for discussion).

A central goal of this paper is to establish that the structure of the (ordered) set

⁵The pairs of adjectives still encode different measure functions corresponding to different perspectives on this dimension, though (*wide* corresponds to a horizontal perspective on linear extent, and *tall* to a vertical one), and so impose different orderings on the individuals to which they apply.

of degrees — the scale itself — is also linguistically significant. In theory, several different structural features could be important, including whether a scale is finite or infinite, whether it is dense or discrete, whether it contains minimal or maximal elements or not, and so forth. Determining the full range of structural variation in scales that natural languages are sensitive to would require an empirical investigation that goes beyond the scope of a single paper, however, so our strategy here is to focus on just one of these parameters: whether a scale is OPEN (lacks a minimal element, a maximal element, or both) or CLOSED (has minimal and maximal elements).

Intuitively, the open/closed distinction looks exactly right for characterizing the difference between the adjectives in (17a) and those in (17b): the former appear to involve properties that can have maximal and minimal values, while the latter do not.

- (17) a. empty, full, open, closed
 b. long, short, interesting, inexpensive

Some readers might find it more intuitive to assign minimal values to the scales for the adjectives in (17b); e.g. for *long*, a value corresponding to a length of 0. However, empirical evidence that this is not correct comes from linguistic data involving PROPORTIONAL MODIFIERS like *half*, *mostly* or *most of the way* which are acceptable with adjectives like those in (17a) and unacceptable with adjectives like those in (17b). This is illustrated by the contrasts in (18) and (19) (see Lehrer 1985; Cruse 1986; Hay 1998; Kennedy and McNally 1999; Paradis 2001; note that the choice of individual to which the adjective is applied is crucial, about which we say more in section 5).

- (18) *Closed scale adjectives*
 a. The box is half empty/full.
 b. The door is half open/closed.
 c. The glass is mostly empty/full.
 d. Her eyes were most of the way open/closed.

- (19) *Open scale adjectives*
 a. ??The rope is half long/short.
 b. ??A 15-year-old horse is half old.
 c. ??That car was half inexpensive.
 d. ??The road was mostly long/short.
 e. ??That horse is mostly old.
 f. ??That book was mostly inexpensive.

The contrasts in (18)-(19) can be accounted for via semantic requirements imposed by the proportional modifiers, combined with the independently justifiable assumption that antonym pairs like *long* and *short* share the same scale.

Let us first consider the proportional modifiers. Assuming the *half* and *mostly/most of the way* have interpretations along the lines of those in (20), where S_G denotes the scale associated with a gradable adjective G , they are compatible only with adjectives that map their arguments onto scales with maximal and minimal elements. (The DIFF function returns the difference between two degrees; see Kennedy 2001.)⁶

- (20) a. $\llbracket \text{half} \rrbracket = \lambda G \lambda x. \exists d [\text{DIFF}(\max(S_G), d) = \text{DIFF}(d, \min(S_G)) \wedge G(d)(x)]$
 b. $\llbracket \text{mostly/most of the way} \rrbracket = \lambda G \lambda x. \exists d [\text{DIFF}(\max(S_G), d) < \text{DIFF}(d, \min(S_G)) \wedge G(d)(x)]$

A derivation for *half empty*, for example, would thus be as shown in (21) (where S_e represents the scale associated with *empty*); what we end up with is a property that is true of an object if its degree of emptiness corresponds to the midpoint of the scale.

- (21) $\llbracket \text{half} \rrbracket(\llbracket \text{empty} \rrbracket)$
 $= \lambda G \lambda x. \exists d [\text{DIFF}(\max(S_G), d) = \text{DIFF}(d, \min(S_G)) \wedge G(d)(x)](\llbracket \text{empty} \rrbracket)$
 $= \lambda x. \exists d [\text{DIFF}(\max(S_e), d) = \text{DIFF}(d, \min(S_e)) \wedge \llbracket \text{empty} \rrbracket(d)(x)]$
 $= \lambda x. \exists d [\text{DIFF}(\max(S_e), d) = \text{DIFF}(d, \min(S_e)) \wedge [\lambda d' \lambda y. \text{empty}(y) \succeq d'](d)(x)]$
 $= \lambda x. \exists d [\text{DIFF}(\max(S_e), d) = \text{DIFF}(d, \min(S_e)) \wedge \text{empty}(x) \succeq d]$

The reason why the adjectives in (18) must have closed scales should be obvious: if the scale associated with the adjectives accepting e.g. *half* lacked either a minimal or maximal element, it would be impossible to calculate the difference between the minimum and maximum values on the scale and thus to identify the midway point required by the degree modifier.

Having shown evidence for the existence of totally closed scales, we now turn to the other logical possibilities. Starting from the assumption that scales may or may not have maximal and minimal elements, there are three additional variations to consider: a scale may have neither a minimal nor maximal element, it may have a minimal but no maximal element, or it may have a maximal but no minimal element. The first option corresponds to a totally open scale; the second and third options are lower closed and upper closed, respectively.

To make things precise, let us assume that degrees are values that are isomorphic to the real numbers between 0 and 1. Note that we do not need to assume that scales are actually constructed out of numbers (i.e., that gradable adjectives actually map their arguments onto numerical values), though this is one way of formalizing them (see Klein 1991 for discussion). What is important is that whatever the ontological status of degrees — whether they correspond to numbers, equiva-

⁶Although there are slight differences in the distributions of *mostly* and *most of the way*, for the purpose of making this point about closed scales we can treat them as synonymous.

lence classes of objects in a model (Cresswell 1977), mental constructs (Bierwisch 1989), or something else — they can vary with respect to (at least) the open/closed distinction.

We will represent the four hypothesized scale structures as in (22), where R and Δ represent the ordering relation and dimension for the scale, respectively.

(22) *A typology of scale structures*

- | | | |
|----|--|------------------------|
| a. | $\langle D_{(0,1)}, R, \Delta \rangle$ | (TOTALLY) OPEN SCALE |
| b. | $\langle D_{[0,1)}, R, \Delta \rangle$ | LOWER CLOSED SCALE |
| c. | $\langle D_{(0,1]}, R, \Delta \rangle$ | UPPER CLOSED SCALE |
| d. | $\langle D_{[0,1]}, R, \Delta \rangle$ | (TOTALLY) CLOSED SCALE |

Scales which are open on the lower end include all of those degrees which approach the limit of 0 but lack a degree whose value is less than that of all the others in the set; scales which are closed on the lower end include such a minimal value, equal to 0. Analogously, scales which are open on the upper end include all of those degrees which approach the limit of 1 but lack a degree which is greater than all the others in the set; those which are closed on the upper end have a maximal degree whose value is 1.

Just as we used proportional modifiers to identify adjectives associated with closed scales, we can use the distribution of endpoint-oriented modifiers such as *100%* or *fully* to identify those adjectives which manifest the other scale types. However, in order to get full use out of this diagnostic, we need to take adjectival polarity into account. Recall that positive and negative pairs of adjectives make use of the same set of degrees and an ordering along the same dimension, but the orderings are the inverse of each other.⁷

The feature of polarity that we are concerned with here 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).

With this in mind, we can now use endpoint-oriented modifiers to determine whether all of the scale types listed in (22) are attested. Given the assumptions about polarity outlined above, we predict that modifiers that pick out maximal degrees should be acceptable with positive adjectives only if they use a scale with a

⁷The antonyms *tall* and *short*, on this view, include the measure functions in (ia) and (ib), respectively, where the domain $u \subseteq U$ is that subset of the universe that includes just objects with some height value.

- (i) a. **tall:** $f : u \subseteq U \rightarrow \langle D_{(0,\infty)}, \preceq, height \rangle$
b. **short:** $g : u \subseteq U \rightarrow \langle D_{(0,\infty)}, \succeq, height \rangle$

maximal element, and with negative adjectives only if they use a scale with a *minimal* element. In other words, the four scale types should give rise to the pattern of acceptability in (23) for the indicated degree modifier/polar adjective collocations.

(23)	OPEN	L-CLOSED	U-CLOSED	CLOSED
[Deg _{max} A _{pos}]	??	??	✓	✓
[Deg _{max} A _{neg}]	??	✓	??	✓

As shown by the following examples, we find pairs of antonyms which share the same scale and which manifest each of the patterns predicted to exist:⁸

(24) *Open scale pattern*

- a. ??Her brother is completely tall/short.
- b. ??The pond is 100% deep/shallow.
- c. ??Max is fully eager/uneager to help.

(25) *Lower closed scale pattern*

- a. ??The pipe is fully bent
- b. The pipe is now fully straight.
- c. ??This path is 100% hilly.
- d. This path is 100% flat.
- e. ??That author is completely famous.
- f. That author is completely unknown.

(26) *Upper closed scale pattern*

- a. We are fully certain about the results.
- b. ??We are fully uncertain about the results.
- c. This product is 100% pure.
- d. ??This product is 100% impure.
- e. The treatment is completely safe.
- f. ??The expedition is completely dangerous.

(27) *Closed scale pattern*

- a. The room was 100% full/empty.
- b. The flower was fully open/closed.

⁸ Modifiers of maximality like *completely* and *totally* have an additional use that is roughly synonymous with *very*; the true maximality use and this latter use are distinguished by their entailments. A maximality use entails that the end of a scale has been reached, as shown by the fact that (ia) is a contradiction; a non-proportional use carries no such entailment, thus the contingency of (ib).

- (i) a. #The line is totally straight, though you can make it straighter.
- b. I'm totally intrigued by bowling, and Kim is even more intrigued by it than I am.

Although we cannot explore here the question of why these modifiers would come to have such a use, our intuition is that it might have originated in a hyperbole or metaphor based on something which was originally literally interpreted along the lines of e.g. "All of me is intrigued by bowling."

- c. The figure was completely visible/invisible.

Future research should be directed towards fleshing out these distinctions and their consequences in greater detail. For now, however, we can conclude that, perhaps contrary to intuition, it does not appear correct to posit that the scales associated with adjectives such as *tall* or *inexpensive* have a minimum value. More generally, the modifier facts establish an initial set of evidence that scale structure is a linguistically significant parameter of variation in gradable adjective meaning.

4. SCALE STRUCTURE AND STANDARD OF COMPARISON

4.1. RELATIVE VS. ABSOLUTE GRADABLE ADJECTIVES The distributions of endpoint-oriented and proportional modifiers are not the only area in which we see the significance of scale structure. A number of recent works have uncovered other empirical consequences of the open/closed scale distinction in several different empirical domains. For example, Vanden Wyngaerd (2001) argues that the open/closed scale distinction is relevant to the licensing of resultative predicates in Dutch and Wechsler (2002) makes similar claims for English. Of particular relevance to us is the work of Rotstein and Winter (2001), who argue that this aspect of scale structure correlates with the ‘total’ vs. ‘partial’ predicate distinction identified by Yoon (1996). Roughly speaking, a total predicate is one like *(is) clean*, which is true of an object if it has a maximal degree of cleanliness, while a partial predicate is one like *(is) dirty*, which is true of an object just in case it has some degree of dirtiness.

Here we would like to claim that the correlation observed by Rotstein and Winter arises specifically because scale structure influences a crucial feature of the interpretation of gradable adjectives in context: the determination of the standard of comparison. As observed in section 2, scalar analyses of gradable adjective meanings assume that the standard of comparison is determined contextually. An expectation of such analyses is that all predicates headed by (unmodified) gradable adjectives should give rise to the sort of vagueness observed with *tall* and *expensive*. This is not the case, however: there are many adjectives that are demonstrably gradable but whose standards are not context-dependent in the way discussed above.

For example, the adjectives in (28) simply require their arguments to possess some *minimal* degree of the gradable property they introduce, not that the degree to which the arguments possess this property is greater than some contextually determined standard. (These correspond to the Yoon/Rotstein/Winter partial predicates.)

(28) *Minimum standards*

- a. The baby is awake.
- b. The spot is visible.
- c. The door is open.
- d. The rod is bent.

Under normal usage, (28a) does not mean that the degree to which the baby is awake surpasses some standard (for babies), but rather simply means that the baby has a non-zero level of awakesness. Likewise, (28b) is true as long as even just a small part of the spot can be seen, no matter how faintly, (28c) just requires some minimal positive aperture of the door, and (28d) is true of a rod that is minimally bent.

The adjectives in (29) are similar, except that their arguments are required to possess a *maximal* degree of the property in question. (These correspond to total predicates.)

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

(29a) typically means that the glass is completely full, not that its contents fall above some standard of fullness, (29b) is an assertion that the road has no bumps, (29c) requires the door to be completely closed, and (29d) requires a completely straight rod.

Note that these facts do not indicate that these adjectives are not gradable. As shown by (30), they are perfectly felicitous in comparatives, in contrast to what we find with true nongradable adjectives such as those in (31).

- (30)
- a. The baby is more awake now than it was a few minutes ago.
 - b. The sign for the Main Street exit is less visible than the one for the Spruce Street exit.
 - c. The glass isn't as full as I would like it to be.
 - d. Rod A is straighter than Rod B.
- (31)
- 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.

Following Unger (1975), we refer to adjectives like those in (28) and (29) as ABSOLUTE adjectives, and 'ordinary' gradable adjectives with context-dependent standards as RELATIVE adjectives.⁹ Other than Unger's work, there has been little discussion of absolute adjectives in the semantics literature. (Unger focuses specifically on the behavior of the gradable adjective *flat*, as well as the predicates *certain* and *know*, as part of a broader philosophical argument for a skeptical epistemology.)

⁹More precisely, what we are really classifying is adjectives *on a given interpretation* or *interpretations* of adjectives, because it is possible for an adjective to be interpreted with respect to more than one kind of scale and standard. However, to avoid wordiness we will talk simply in terms of "adjectives".

This may stem from a strong initial intuition that our characterization of the facts is both too strong and too weak: that the adjectives in (28) actually require something significantly more than a minimum standard, and that those in (29) actually allow something less than a maximum standard. These intuitions seem to be supported by examples like those in (32).

- (32) a. I'm not awake yet.
 b. The gas tank is full, but you can still top it off. It's not completely full yet.
 c. The theater is empty tonight.

(32a) can be felicitously uttered by someone who is not talking in his sleep. Likewise, most speakers we have consulted feel that *full* only requires its arguments to fall *near* the maximal value on the scale, pointing to examples like (32b), which does not sound contradictory (but cf. the examples discussed below in (35)). Similarly, (32c) 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.

On the whole, it is fairly easy to come up with other 'imprecise' uses of absolute adjectives, calling into question our claim that these adjectives represent a semantic class distinct from relative gradable adjectives. While it is arguably true that in some cases imprecise uses reflect a semantic shift away from a 'default' absolute meaning towards a purely relative one (a point to which we return in section 4.3 below), we nevertheless contend that there are compelling arguments for maintaining the claim that absolute adjective interpretations are semantically distinct from relative adjective interpretations.

First, from a purely theoretical perspective, it is fairly straightforward to account for imprecise uses of absolute adjectives such as (32) while still maintaining the claim that they have maximum or minimum standards. The simplest strategy would be to claim that the propositions conveyed by sentences like these are strictly speaking *false*, and explain their felicity and informativity in terms of general pragmatic principles governing the interpretation of 'loose talk' (this is essentially Unger's position).

Formally, we could implement this approach in terms of Lasnik's (1999) theory of PRAGMATIC HALOS, which provides a framework for determining how much deviation from what is actually true still counts as 'close enough to the truth' in any context to be an acceptable amount of deviation. Lasnik proposes that 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. In the case of (32c), for example, we can maintain our claim that the actual denotation of the predicate headed by *empty* is a property that is true only of objects that are com-

pletely empty, but that its pragmatic halo includes properties that are true of objects that are just a little bit less than empty. How much less is determined by context; in this case, by non-linguistic factors such as the size of the theater, expectations about attendance, and so forth.

Alternatively, we could account for imprecise uses in terms of variable “granularity” of degrees. On this view, the degrees used by a gradable adjective in different contexts would be parallel to different rulers that encode inches, half inches, quarter inches, sixteenth inches, and so forth. Measures will or will not count as maximal depending on how fine-grained these distinctions are: a line that measures 11 3/4 inches counts as maximal with respect to a ruler that encodes only has inch increments, but not with respect to one that encodes sixteenth-inch increments.

Regardless of how we account for imprecise uses of absolute adjectives, if our claim that their meanings involve endpoint-oriented standards is correct, we should be able to find empirical evidence that distinguishes them from relative gradable adjectives. In particular, we predict that they should show a significantly smaller degree of variation in the position of the standard than relative adjectives (since any variation would be governed by the principles of “loose talk”, rather than being freely allowed), and we expect to find evidence that the standards used by absolute adjectives involve minimal and maximal degrees. In the next section, we present data that supports both of these conclusions; see Kennedy 2003 for additional argumentation in favor of this point.

4.2. ENTAILMENTS OF ABSOLUTE VS. RELATIVE ADJECTIVES Entailment patterns provide the clearest evidence in favor of a semantic distinction between relative and absolute adjectives. If the standards associated with the latter involve endpoints, then the denotations of the APs they head can be characterized as in (33).

- (33) a. $\llbracket [\text{AP } \text{adj}_{\min}] \rrbracket = \lambda x. \exists d [d \succ \min(S_{\text{adj}}) \wedge \text{adj}(x) \succeq d]$ *min std*
 b. $\llbracket [\text{AP } \text{adj}_{\max}] \rrbracket = \lambda x. \exists d [d = \max(S_{\text{adj}}) \wedge \text{adj}(x) \succeq d]$ *max std*

These truth conditions are just like what we posited above in (13), except that the restrictions on the standard are explicit, rather than context-dependent: (34a) requires it to be a minimum degree and (34b) a maximum degree. Note that we are maintaining the assumption here that absolute adjectives are of the same semantic type as relative adjectives (all gradable adjectives are of type $\langle d, et \rangle$); that this is the case is shown most clearly by the fact that they can appear in comparative constructions, as illustrated by (30) above. The representations in (33) indicate what the truth conditions of adjective phrases headed by minimum and maximum standard absolute adjectives must be if our empirical claims are correct; how we actually get to these interpretations instead of the context-dependent interpretation we posited for relative adjectives in section 2 is a separate question that we cannot address here (though see Kennedy 2003 for a proposal). For the purposes of this paper, we may assume that there is some lexical feature on absolute adjectives that sets the domain

restriction variable **C** discussed in section 2 to the appropriate value in (33a) or (33b).

The truth conditions in (33a-b) make clear predictions about entailment patterns. First, (33a) predicts that a denial *a is not adj_{min}* should entail that *a* possesses no amount *adj*-ness at all. The contradictory statements in (34) illustrate that this prediction is borne out.

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

Second, (34b) 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, since maximum standard adjectives readily allow imprecise uses (see the discussion of (32) above), but the examples in (35) involve cases in which an imprecise interpretation is highly unlikely (and see Unger 1975 for arguments that it is possible to force a precise interpretation by adding focal stress to the adjective). B's response in (35a) is readily understood as a joke, but note that the joke wouldn't be possible if A's assertion didn't, strictly speaking, entail that B's glass was 100% empty. And according to our intuitions, *dead*, unlike e.g. *full*, is rarely if ever used imprecisely, hence the outright oddness of (35b).¹⁰

- (35) a. A: Your glass is empty; let me get you another beer.
B: No it's not – there are still a few drops left in it.
b. #The plant is dead, though one part of it still appears to be alive.

Since the truth conditions for a relative adjective entail only that its argument falls above a contextually determined standard of comparison, neither of these entailments should hold. This is correct:

- (36) 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 is discussed in Cruse 1986 (see also Rotstein and Winter 2001). As shown by the examples in (37), there exist pairs of antonyms such that negation of one form entails the assertion of the other:

- (37) 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.

The explanation for this is straightforward: both members of the pairs in (37) are absolute adjectives, but the positive adjectives impose minimum standards while

¹⁰ Although *dead* is sometimes taken as a paradigmatic case of an ungradable adjective, the felicity of expressions such as *half dead* or *almost dead* indicate that it is, in fact, gradable, associated with a closed scale and an upper endpoint standard (see below; see also Rotstein and Winter 2001).

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 (37) follow from the truth conditions in (33) (recall the discussion of polarity in section 3).

Relative antonyms do not give rise to the same entailment patterns, as illustrated by (38).

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

Again, this follows from the fact that the standards for both positive and negative relative gradable adjectives are contextually identified, and crucially need not be endpoints (in fact, cannot be endpoints if the scales are open). 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*, and we allow for the possibility of a ‘grey area’ between the standards onto which fall objects that are neither large nor small (Sapir’s (1944) ZONE OF INDIFFERENCE; Klein’s (1980) EXTENSION GAP). Indeed, the possibility of such ‘borderline cases’ is one of the defining properties of vague predicates; see Williamson 1994 for further discussion.

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. (This test presupposes that the adjectives being tested have context-insensitive standards, however; cf. Knowles 1974, pp. 23-24.) If the standard is a maximal degree, then an affirmation such as *x is half/partially adj* entails that *x is not adj*, as shown by (39a-b).

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

If the standard corresponds to the lower endpoint, however, then such an affirmation entails that *x is adj*. This is illustrated by the examples in (40).

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

Finally, relative and absolute adjectives trigger different kinds of entailments in comparative constructions. If the truth conditions associated with minimum and maximum standard absolute adjectives are as in (33), we expect them to generate positive and negative entailments to the positive form, respectively (depending on which argument of the comparative we use). This prediction is borne out, as shown by the examples in (41) and (42).

- (41) a. The floor is wetter than the countertop. $\models$

- b. The floor is wet.
- (42) a. The floor is drier than the countertop. $\models$
- b. The countertop is not dry.

Assuming the comparative imposes an asymmetric ordering on its arguments (see the truth conditions for the comparative in section 6.1), (41a) will be true only if the floor has some degree of wetness (though the countertop may have a zero degree). The truth of (41b) then follows directly from the minimum standard truth conditions in (33a). Similarly, in order for (42a) to be true, it must be the case that the countertop is not maximally dry (though the floor might be). If the standard for dryness is the maximum value on the scale, as stated in (33b), then it follows that the countertop is not dry.

In comparison, a canonical property of comparatives with relative adjectives, is that they do not give rise to positive or negative entailments in the comparative form, as illustrated by (43)-(44).

- (43) a. Rod A is longer than rod B. $\nVdash$
- b. Rod A/B is (not) long.
- (44) a. Rod A is short than rod B. $\nVdash$
- b. Rod A/B is (not) short.

This also follows, since the mere fact that one object exceeds another with respect to some relative property tells us nothing about how the objects stand in relation to a contextually determined standard of comparison.

4.3. RELATING SCALES AND STANDARDS The conclusion to be drawn from these entailment 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 above show that the absolute/relative distinction — whether a gradable adjective has a context-sensitive or context-insensitive standard — is in fact linguistically significant.

This conclusion raises the following question: is there a principled relationship between an adjective's scale structure and its standard value? The data discussed so far suggest the following generalization: gradable adjectives associated with totally open scales have relative standards; gradable adjectives that use totally or partially closed scales have absolute standards. The first of these two generalizations is exceptionless: since open scales lack endpoints, it is impossible for open scale adjectives to have endpoint standards. While we will see below that the second of these two generalizations is not exceptionless, 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*).

There are at least two, mutually compatible, explanations for such a default. The first is primarily functional. The endpoints of a totally or partially closed scale provide a fixed value as a potential standard, which in turn makes it possible to assign context-independent truth conditions to the predicate (*greater than a minimum, equal to a maximum*). The alternative — and the only option available for adjectives with open scales — is to compute the standard based on some context-dependent property of degrees, as discussed in section 2. If we assume that interpretations that minimize context-dependence are in general preferred, then closed-scale adjective should favor an absolute interpretation.

The second explanation has to do with the way in which adjectival properties come to hold of entities. In many cases, an adjectival property comes to be true of an entity in virtue of that entity having participated in some kind of event or state. As we explain in further detail in the next section, there is a strong correlation between the structure of such an event, the role played by the relevant entity in it, and the satisfaction conditions (including the nature of the scale structure) for the adjectival predication whose truth is supported as a result of the event or state transpiring. The result, as we will see below, is a maximal or minimal absolute standard, depending on the relation of the argument to the event.

5. FACTORS DETERMINING SCALES AND STANDARDS We now turn to the issue of whether an adjective can be associated with more than one kind of scale, and, more generally, to that of whether we can predict for an arbitrary adjective what kind of scale structure and standard value it will use. In this section we argue that the scale structure of deverbal adjectives can be predicted based on the event structure associated of the source verb, and that in the case of all adjectives a crucial factor is the boundedness of the adjective's argument (cf. Paradis 2001). We further show that 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. Our focus here is on derived adjectives because we believe that these are the best candidates for observing the way that scale structure is determined 'on the fly'. Whether our observations can be extended to an explanation of why different lexical adjectives have the scales they do is an issue we will have to leave for future work; for now, we assume that the scalar properties of lexical adjectives are encoded in their lexical entries.

5.1. EVENT STRUCTURE AND THE SCALE STRUCTURE Taking as a starting point the class of deverbal gradable adjectives with totally closed scales (those that are acceptable with proportional and endpoint-oriented modifiers), the data that we have observed indicate that this class corresponds very closely to the class of verbs that introduce incremental arguments. As pointed out by Krifka (1989, 1992) (see also Dowty 1991; Tenny 1995; Jackendoff 1996; Ramchand 1997), what is unique about this class of verbs is that it is possible to establish a homomorphic relation-

ship between the events they denote and their incremental arguments. This homomorphism is captured formally by Krifka in terms of his notion of MAPPING TO OBJECTS, defined as a characteristic of thematic roles R as follows (Krifka 1989, p. 92):

$$(45) \quad \forall R[\mathbf{MAP-O}(R) \leftrightarrow \forall e \forall e' \forall x [R(e, x) \wedge e' \subseteq_E e \rightarrow \exists x' [x' \subseteq_O x \wedge R(e', x')]]]$$

In prose, MAP-O guarantees that all subevents e' of a given event e with participant x in role R (what Dowty 1991 refers to as the ‘incremental theme’) involve a part x' of x . A typical incremental theme is the object of the verb *eat*: for all subevents of a given event of eating an orange, for example, we can identify unique parts of that orange which were eaten during each of those subevents. Conversely, we know how much of the eating-an-orange event has been completed by examining how much of the orange has disappeared; the homomorphism in this direction is captured by Krifka’s analogous notion of MAPPING TO EVENTS (see Krifka 1989, p. 92).

As pointed out by Ramchand (1997), however (see also Jackendoff 1996, Krifka 1998 and in particular Hay et al. 1999), there are at least two additional types of incremental arguments: what she calls $\text{Pat}(\text{ient})_{+/-}$ and Pat_{LOC} . $\text{Pat}_{+/-}$ arguments are those which undergo an incremental change of state, such as the subject of the verb *cool* in a sentence like *The soup cooled*. Those verbs for which a homomorphism can be established between the progress of the event and the location of one of its participants have Pat_{LOC} arguments. For example, the verb *descend* in *Max descended the staircase* entails incremental movement of the subject along a path defined by the direct object.¹¹

We claim that it is precisely the homomorphic relation between the incremental theme argument and the corresponding event that is responsible for the scalar properties of adjectives derived from this class of verbs. Specifically, since such adjectival participles measure the degree to which their arguments have participated in the event described by the source verb, their scales should have 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 (or a minimal degree of the relevant measurable property for $\text{Pat}_{+/-}$ arguments, or a minimal movement along the relevant path for Pat_{LOC} arguments); the maximal degree on the scale represents participation in the maximal event involving (all of) the incremental theme/property/path.

As an example, consider *loaded*, as in (46).

¹¹Whether the three types of incremental roles posited by Ramchand are theoretically justified, or whether these different classes of incremental verbs can be subsumed under a single, general semantic analysis, as suggested in Hay et al. 1999, is not a question that we are able to address here. What is important for us is that all of these verbs are similar in the incremental relation between (different aspects of) their arguments and the described events, and that this relation forms the basis for building a closed scale for the adjectival form, as explained below.

- (46) The truck is loaded with hay.

Let us assume, generalizing Dowty's (1991) analysis of *spray/load* verbs, that the truck is the incremental theme in the loading event described in (46). We can define a mapping between the progress of the event of loading and a property of the truck, namely, the volume of the material that it holds; the degree to which the truck can be said to be loaded corresponds to the degree to which it has progressed through a loading event. Since we can define a beginning point and endpoint for this event (corresponding to when the truck is unloaded and loaded, respectively), we can identify minimal and maximal values for the scale of 'loadedness' of the truck.

The following examples support the generality of the claim that if an adjective is derived from a verb with an incremental argument, that adjective will have a closed scale: these adjectives are compatible with proportional and endpoint-oriented degree modifiers.¹²

- (47) "*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

- (48) *Pat*_{+/-} arguments

- 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

- (49) *Pat*_{LOC} arguments

- a. a partially crossed desert
- b. a half descended staircase
- c. fully raised blinds
- d. a completely traversed distance

Now let us consider the implication that, if a participial adjective has a totally closed scale, it is derived from a verb with an incremental argument. If this implication is correct, then those adjectives derived from verbs *lacking* such arguments should *not* have closed scales, and it should be impossible to combine them

¹²Space precludes explicitly demonstrating that these and the remaining participles discussed in this paper are adjectives. However, the reader can confirm for him/herself that the majority of them accept *un-*prefixation, and those which do not (like *hated*) occur readily as the complement to predicates like *seem*. See e.g. Levin and Rappaport 1986 on the question of which participles in English can be adjectival.

with proportional/endpoint-oriented modifiers. And indeed, the examples we have found, such as those illustrated in (50), systematically bear out this prediction. Note that these participles are derived from atelic verbs (whether stative or nonstative, (50a)-(50d)) or from verbs which are telic but in which the theme or experiencer argument is affected wholistically (50f) or experiences a change in property which is necessarily mapped onto an open scale (50g).

- (50) *Adjectives derived from non-incremental theme verbs*
- a. ??a completely hated/loved/envied/admired neighbor
 - b. ??a fully needed/wanted rest
 - c. ??a partially regretted action
 - d. ??a completely looked for reaction
 - e. ??a completely watched suspect
 - f. ??a partially kissed/met/punched young man
 - g. ??a fully worried mother

If telic verbs with incremental arguments map onto totally closed scales, what should we expect from adjectives derived from atelic verbs such as *needed* or *looked for*? If the same sort of homomorphic relation exists between the event structures of atelic verbs and the scale structures of the corresponding adjectives, then such adjectives should 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 is 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.

Consider for example *needed*. If the Mediterranean coast needs even just a tiny bit of rain (for example, because it's rained just slightly less than normal for the season), it is entailed that rain is needed. If the drought continues, the degree to which the rain is needed will increase. But just as it makes no sense to talk about the *culmination* of this need relation (as opposed to its *end*), it makes no sense to talk about the rain being 'completely needed'.

Observe that the ordering of entities (or events, since they can be needed too) on the 'neededness' scale in this example determined by the temporal duration of the need relation that supports the truthful ascription of the adjective. Similarly, most of the modified APs in (51) can be paraphrased as *APed for a long time*.

- (51)
- 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

These examples anticiapte the analysis of *much* to be presented in section 6.3, which requires the adjective to have a lower closed scales. Our interest here is that they also show that temporal duration is not the only way to measure neediness, admiration, and so forth; rather the the mapping from (verbal) events to (adjectival) scales can be influenced by other other aspects of the source verb's meaning.

For example, arguably the most natural reading of *much admired* is paraphrasable as *admired by many people*, without necessarily entailing that the admiration has been long lasting; at the same time, *a much talked about program* might well be one which has been talked about many times, though not necessarily by many different people or for a particularly long time on any given occasion. Adjectives denoting the property of being the object of an emotion, such as *admired*, *loved*, or *hated*, or the experiencer of an emotion, such as *worried*, also permit readings on which the scalar dimension along which they are measured is one of intensity. For example, a much despised neighbor might be despised by only one individual, but with a passion.

What these facts indicate is that the dimensional parameter of the derived scale, like the structure of the scale, is also a function of the meaning of the source verb. Specifically, any of the various aspects of verb meaning that support measurement (temporal extent, number of occurrences, number of participants, intensity, etc.) can be used to fix the dimensional parameter of the derived adjective's scale. We may assume that any particular adjectival form (*needed*, *admired*, etc.) is compatible with several dimensions, one of which must be settled upon in a context of utterance. In the domain of lexical adjectives, this phenomenon is known as INDETERMINACY, and is illustrated by the dual uses of e.g. *long* as a measure of temporal or linear extent (see McConnell-Ginet 1973; Kamp 1975; Kennedy 1999b for discussions of indeterminacy).

In all of these cases, however, the structure of the scale for the derived adjective is constructed in the same way: by mapping from a set of potentially complex events which can be ordered in an algebraic structure as proposed in e.g. Link (1983), Landman (1989), or Lasersohn (1995). Such algebraic structures are formed by summing together larger events out of smaller ones—for instance, various 'atomic' events in which the same statesman is the object of admiration, possibly by a different person each time, or in which the same program is talked about. These events are ordered by increasing size (and complexity), and this ordering, in turn, can map onto a scale which is bounded on the lower end but not on the upper end, since there is in principle no limit to the number of individuals that can admire someone, nor to the number of times an event such as talking about something can be iterated.

The hypothesis that event structure correlates with scale structure makes an additional prediction: no deverbal adjective should, in principle, be associated with a scale which is open on the *lower* end, whether or not it is bounded on the upper

end. The reason is that there should always be a minimal event which supports the truth of the adjectival predication and which is homomorphically related to the lower bound on the scale. Evidence that this prediction is correct comes from the fact that, 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 *completely* (see section 3, above).

5.2. BOUNDED ARGUMENTS, BOUNDED SCALES Although the generalizations described in the previous section are quite robust, one also finds some *prima facie* counterexamples. One is *known*. The verb *know* is stative, and thus atelic, in English. Given what was said in the previous section, we would predict that *known* would be associated with a scale that is bounded on the lower end but open on the upper end. Nevertheless, examples such as (52), in which the adjective cooccurs with an (upper) endpoint-oriented modifier, are felicitous:

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

How does *know* come to be associated with a closed scale? More specifically, what might provide the basis for a homomorphic mapping to that closed scale?

There are two possible answers to this question in the case of *known*. One would be that 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. However, a more interesting and, we think, much more likely answer is that the extension of the adjective’s argument provides the basis for building the closed scale. 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. In general, any adjective which can apply not only to the whole of an entity but also to its parts could also be associated with a scale based on the part structure of that entity.

A look at the facts supports the systematic ability of an adjective’s argument to determine the scale used for interpreting that adjective, including with adjectives which are not deverbal. Consider the adjective *hot* for example. Although it rejects modification by an endpoint-oriented adjective when its argument is not easily considered bounded, as in (53a), such modification becomes possible when the adjective is applied to something clearly bounded, as in (53b), which is paraphrasable as “All of the baby’s face is hot.”

- (53) a. ??Outside it’s completely hot.
b. The baby’s face is completely hot.

(54) makes the same point: A mass noun such as *milk*, even when understood generically, does not identify a bounded entity whose physical extension could form the basis for a mapping to a closed scale; consequently, the use of *completely* in (54a)

sounds odd. In contrast, when the adjective is predicated of a bounded argument such as in (54b), the degree modifier becomes acceptable and the sentence entails that the entirety of the suit was white.

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

A slightly different manifestation of the same general effect is found with adjectives that describe properties that can hold in different degrees of proper parts of an object, as well as of the object as a whole, such as *wet*, *cooked*, or *frozen*. The degree of wetness of an object can be measured along two dimensions: the degree of saturation with water, which would appear in principle to be unbounded the extent to which the object

The second source of evidence comes from the vagueness observable in (55), in which we find the modifier *half*, which, like *completely*, requires an adjective with a closed scale:

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

(55a) 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. In other words, in addition to the scale made available by the event structure of *cook* — the scale relevant for the first construal of the sentence — *cooked* can also be associated with a closed scale made available by the part structure of the meat, which is relevant for the second construal of the sentence.

Though we must leave for future research a full analysis of the effects of event structure and the boundedness of the adjective's argument on the determination of scale type, the above examples are sufficient to demonstrate that the scale type of adjectives is often predictable, and that regularities can be established not only between the algebraic part structure of events and scale structure, but also — in a parallel fashion — between the algebraic part structure of individuals and scale structure.

5.3. PREDICTING THE ORIENTATION OF ABSOLUTE STANDARDS We close this section with one final example of the tight relationship between event structure and scale structure: the role that the former plays in allowing us to predict whether an absolute adjective defaults to a minimum or maximum standard.

The data show 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 corresponding verb. Adjectives whose arguments satisfy Mapping to Objects (see (45), above), such as *cut* and *written*, systematically have upper endpoints as standards, while those whose arguments do not, such as *acquainted* and *documented*,

have lower endpoints as standards. This correlation is exemplified in (56) and (57). The fact that (56a) and (56b) are mutually entailing supports the claim that the argument of *cut* satisfies Mapping to Objects. The fact that (56a) does *not* entail (56c) shows that the standard for *cut* is the maximum value on the scale (see the discussion in section 4.2).

- (56) a. The grass is half cut.
 b. Half of the grass is cut.
 c. The grass is cut.

A different pattern appears in (57). Here we see that (57a) and (57b) are *not* mutually entailing; rather, (57a) entails (57c). This indicates that the (external) argument of *acquainted* does not satisfy Mapping to Objects. And again in contrast to what happens with *cut*, (57a) entails (57d), as expected if the adjective has a minimum standard.

- (57) a. Beck is partially acquainted with the facts.
 b. ??Part of Beck is acquainted with the facts.
 c. Beck is acquainted with part of the facts.
 d. 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. Consider first the case of the argument satisfying Mapping to Objects. Because 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. The result is a maximum standard.

The situation is different in the case of other types of arguments. Since the completion of the eventuality corresponding to the participle does not depend on affecting all of the relevant argument, or affecting that argument in its entirety, it may be asserted that the eventuality is completed even when that argument has been minimally affected. As a result, the adjectival participle may be truthfully applied to such an argument as long as the argument possesses a minimal degree of the relevant property. This derives a minimum standard.

6. THE DISTRIBUTION OF DEGREE MODIFIERS The central conclusion of the sections 3 and 4 is that scale structure (open vs. closed) and standard value (relative vs. absolute) are grammatically significant properties of individual gradable adjectives. We now return to the issue we started this paper with — the distribution of the modifiers *very*, *much* and *well* in adjectival participles — and show that the facts can be explained in terms of these two semantic features.

6.1. THE SEMANTICS OF DEGREE MODIFICATION Recall from the discussion in section 2 that we are assuming that gradable adjectives — both the relative and absolute varieties — denote relations between individuals and degrees with interpretations along the lines of (58), where $\mathbf{m}$ is a function from objects to degrees on the scale associated with the adjective.

$$(58) \quad \llbracket \text{Adj} \rrbracket = \lambda d \lambda x. \mathbf{m}(x) \succeq d$$

We further assume that degree morphemes denote functions from (gradable) adjective meanings to properties of individuals, whose semantic contribution is to saturate the degree argument of the adjective. In other words, degree modifiers generally have interpretations that match the template in (59), where $\mathbf{R}$ is a property of degrees. (Of course not all degree modifiers may involve existential quantification; we remain agnostic on this issue.)

$$(59) \quad \llbracket \text{Deg} \rrbracket = \lambda G \lambda x. \exists d [\mathbf{R}(d) \wedge G(d)(x)]$$

What distinguishes different degree modifiers from each other is the specific value of $\mathbf{R}$, i.e., the way in which they restrict the adjective's degree argument. The simplest example of this is the case of measure phrases, assuming Klein (1980) is correct in analyzing them as a type of degree term. A measure phrase like *2 meters*, for example, restricts the degree argument of an adjective to measure at least two meters, as shown in (60) (where *2-meters* is a predicate on degrees; see Schwarzschild 2002).

$$(60) \quad \llbracket 2 \text{ meters} \rrbracket = \lambda G \lambda x. \exists d [2\text{-meters}(d) \wedge G(d)(x)]$$

Thus *2 meters tall* denotes a property that is true of an object x if there is a degree that measures 2 meters such that x 's height is at least as great as that.

Note that treating measure phrases as degree terms correctly predicts that they should be in complementary distribution with other degree modifiers:

- (61) a. *Yao is 7 feet very tall.
b. *Yao is very 7 feet tall.

Measure phrases do combine with comparative morphemes, as in (62), but here the measure phrase does not restrict the degree argument of the adjective, but rather a 'differential' argument introduced by the comparative morpheme that denotes the difference (of height, in this case) between the arguments of the comparative. We address this issue in more detail below.

- (62) a. Yao is 5 feet taller than Julian.
b. Yao is 7 inches too tall to fit in this bed.

Like measure phrases, the comparative degree modifiers *more*, *less* and *as* can be placed into the template in (59) by substituting **R** with appropriate orderings relative to a comparative standard — the degree introduced by the comparative *than/as*-clause, which is indicated by d_c in (63).¹³

- (63) a. $\llbracket \text{more ... than } d_c \rrbracket = \lambda G \lambda x. \exists d [d \succ d_c \wedge G(d)(x)]$
 b. $\llbracket \text{less ... than } d_c \rrbracket = \lambda G \lambda x. \exists d [d \prec d_c \wedge G(d)(x)]$
 c. $\llbracket \text{as ... as } d_c \rrbracket = \lambda G \lambda x. \exists d [d \succeq d_c \wedge G(d)(x)]$

Measure phrases and comparative morphemes place only a single, general requirement on the semantic properties of their adjectival arguments: they must be gradable (i.e., they must introduce degrees in the first place). Other degree modifiers, however, place further restrictions on the degree argument that limit the range of gradable adjectives with which they may felicitously combine. We have already seen that proportional modifiers fix the value of the degree argument based on specific features of the modified adjective's scale. For example, the modifier *completely* has an interpretation along the lines of (64) (cf. the analyses of *half* and *mostly* in (20) above), which restricts the degree argument of a gradable adjective to be a maximum on the adjective's scale.

- (64) $\llbracket \text{completely} \rrbracket = \lambda G \lambda x. \exists d [d = \max(S_G) \wedge G(d)(x)]$

Assuming that the *max* function returns a value only for scales with maximal values, this modifier will be felicitous only with gradable adjectives that have scales that are closed on the upper end. (Similar remarks hold for modifiers like *partially* and *half* that make reference to minimal values.)

As we have already seen in great detail, scale structure is not the only significant lexical property of gradable adjectives, however: the nature of an adjective's standard value — whether it is relative or absolute — is also important. We might therefore expect to find degree modifiers that are sensitive to standard type as well as scale structure. In the following sections, we argue that the difference in the distributions of *very* and *much* is crucially accounted for in these terms. We then turn to the modifier *well*, which we claim is of a different semantic type from other degree modifiers, but interacts with both the scale structure and standard value of the expression it modifies.

6.2. 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,

¹³We are ignoring here the question of how the value of the comparative standard is compositionally derived from the structure of the comparative clause, and we also abstract away from differential comparatives here, which require a somewhat different semantics to handle MPs, though see the discussion of comparatives and *much* below for qualification of this point. See Gazdar 1981; Hellan 1981; von Stechow 1984a; Heim 1985; Bierwisch 1989; Rullmann 1995; Hendriks 1995; Kennedy 1999b, 2002 for different approaches to the compositional semantics of comparatives.

except that the relative standard is boosted by some amount. This is illustrated by pairs like the one in (65), which shows that the standard boosting effect of *very* (in terms of absolute increase of degree) depends on how high the initial standard is determined to be.

- (65) a. The international space station is very expensive. (for space projects; *large increase from contextual standard of comparison*)
 b. The coffee at the airport is very expensive. (for coffee; *small increase small increase from contextual standard*)

Klein 1980 accounts for these intuitions by analyzing a predicate of the form *very A* in essentially the same way as its simple, unmodified counterpart, with one important difference. Whereas the regular contextual standard corresponds to a norm or average of the relevant property calculated on the basis of an appropriate comparison class, the ‘*very* standard’ is a norm or average calculated in the same way but just on the basis of those objects to which the simple predicate truthfully applies. For example, in a context in which the standard of comparison for the adjective (phrase) *tall* is the average degree of height for the comparison class *basketball players*, the standard of comparison for the AP *very tall* is an average of height for just the tall basketball players. As a result, some basketball players who count as tall will not count as very tall, and the standard will be effectively boosted.

For perspicuity, we will implement Klein’s analysis in our system by positing a context-sensitive function **very** that restricts the degree argument of a gradable adjective in the way described above. This allows us to analyze the degree modifier *very* as in (66).

$$(66) \quad \llbracket \text{very} \rrbracket = \lambda G \lambda x. \exists d [\mathbf{very}(d) \wedge G(d)(x)]$$

On this view, the interpretation of *very A* relies on the same contextual parameters that are involved in fixing the basic standard of comparison for relative adjectives in general, in particular, the identification of a comparison class. In fact, the connection between *very* and relative adjectives is even stronger: in normal usage, absolute adjectives reject modification by *very*, as illustrated by examples like those in (67).

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

The adjective *dry* provides a particularly clear illustration of this restriction, 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, as in (68a), it can be modified by *very*. As shown by (68b), this use of *dry* accepts *for*-PPs, indicating that it receives a relative interpretation.

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

However, if *dry* is used to describe a more transient sort of property like the amount of moisture on a surface, as in (69b), modification by *very* is impossible, and *for*-PPs are infelicitous, indicating an absolute interpretation.¹⁴

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

In examples in which the object being described does not promote one reading of *dry* over another, we can actually detect an ambiguity. (70a) can be understood either as a claim that my hands have a certain skin quality, or as a claim about the amount of some liquid on them. (70b) is consistent only with the former interpretation, however, while (70c) forces the latter.

- (70) a. My hands are dry.
 b. My hands are very dry.
 c. My hands are partially dry.

There are, of course, apparent counterexamples to the generalization that *very* is infelicitous with absolute adjectives. For example, (71) might be used by a waiter to describe a restaurant that has an uncharacteristically small/large amount of customers in it (depending on the choice of adjective).¹⁵

- (71) The restaurant is very empty/full tonight.

¹⁴These facts reflect Bolinger's observation that the adjective modified by *very* must express an 'essential' rather than 'accidental' property (Bolinger 1972, p. 38-39). In most cases, adjectives with absolute scales are simply incompatible with *very*, though *very* modification is acceptable to the extent that the adjective can have a relative-like, 'essential' interpretation, as illustrated by the examples in (i).

- (i) 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)

¹⁵Of course, *very full* is fully felicitous as a description of one's stomach after a big meal. We assume this to be a fully relative use of *full*, though, as indicated by the absence of a contradiction in an example like (i).

- (i) I'm (very) full, but I saved some room for dessert.

However, we have already seen that absolute adjectives permit relative-like, imprecise interpretations, and there is evidence that this is what is going on here. In particular, *very empty/full* strongly implies not empty/full (a very empty restaurant is one with just a few diners, not one with no diners), indicating that whatever standard is being boosted, it is not the absolute one.

When the context is incompatible with imprecise interpretations — when precision is important — the use of *very* with these adjectives is precluded. For example, consider a context involving an experiment in which some beakers are supposed to be filled with liquid to certain levels indicated by special markings, and others are supposed to be fully emptied of their contents. If an experimenter accidentally fills a beaker beyond the indicated ‘full line’, it would be infelicitous for her to report that situation by saying (72).

(72) Whoops! This beaker is very full. I’d better pour out some of that liquid.

Likewise, once the experimenter has removed all of the contents from another beaker, she cannot felicitously report her action by saying (73).

(73) OK, this beaker is very empty, so we’re ready to use it.

For the time being, we remain neutral as to exactly how relative interpretations of absolute adjectives with *very* come about, since there are various, not entirely mutually exclusive, possibilities: an adjective might be vague with respect to the type of standard used to evaluate its applicability, with context serving to resolve the vagueness; an adjective might have become truly polysemous over time, with the degree modifier serving to disambiguate; or it may be that, faced with an ostensible conflict between the standard required by *very* and that associated with an adjective, speakers are able to reinterpret the adjective in such a way as to eliminate the conflict. What is important for our purposes is that when we control the context to force an absolute use, we see a clear sensitivity of the degree modifier to the relative/absolute standard distinction.

In fact, the restriction of *very* to relative adjectives follows from the Klein-style analysis presented above in (66). Assuming that the **very** function fixes the degree argument of the adjective by 1) taking the computation of the the standard of comparison that is the normal one for the adjective and 2) recomputing the standard just with respect to those objects to which the unmodified form truthfully applies (in the context of utterance), then in the case of absolute adjectives, *very* will have no semantic effect. The computation of the standard of comparison for these adjectives, as we have seen, involves a default mapping to a minimal or maximal degree on the scale. Reapplying this mapping won’t change anything; as a result *very* is semantically vacuous when applied to an absolute adjective, and the resulting predicate is anomalous.

If our claims about *very* are correct, then we expect the class of deverbal gradable adjectives that accept modification by *very* to show properties of relative adjectives. In particular, they should show the entailment patterns observed with other relative adjectives (see section 4.2). The following examples confirm these predictions.

- (74) 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.
- (75) 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.
- (76) a. Gil wasn't relaxed, though he wasn't very nervous, either.
- b. Gil felt relaxed, though he could have been more so.

At the same time, we expect those deverbal adjectives that rejected *very* in favor of modification by *much* or *well* should show properties of absolute adjectives. We turn to this prediction now.

6.3. MUCH We claim that *much* has a meaning that is close to that of *very* — it effectively boosts the standard of comparison associated with the unmodified form — but does so in a somewhat indirect way. Before presenting the analysis, we must substantiate a crucial generalization: deverbal adjectives that accept modification by *much* are minimum standard absolute adjectives. This is illustrated by the following examples, which apply the entailment test for minimum standards (*x is not A* entails *x has no amount of A-ness at all*; see section 4.2) to the participles that we earlier identified as acceptable with *much* (see (3) and Table 1).

- (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.

At the same time, adjectival participles whose entailments under proportional modification show them to have maximum standards (see section 4.2), such as *done*, *written* and *filled*), do not accept modification by *much*:

- (78) a. ??The meat is much done. (partly done $\nmid$ done)

- b. ??The book is much written. (half written $\nmid$ written)
 c. ??The glass is much filled. (partially filled $\nmid$ filled)

To account for the interpretation of *much* and its restriction to minimum standard absolute adjectives, we propose the meaning in (79), where $\succ!!$ is a context-dependent relation along the lines of ‘greater than by a large amount’.

$$(79) \quad \llbracket much \rrbracket = \lambda G \lambda x. \exists d [d \succ!! \min(S_G) \wedge G(d)(x)]$$

Strictly speaking, *much* just requires the degree argument of the adjective it modifies to be appropriately ‘large’. However, it crucially defines largeness in terms of the degree argument’s relation to the minimal value on the adjective’s scale, and so is compatible only with adjectives that use lower closed scales in the first place. As we have seen, adjectives with such scale structures default to (minimum standard) absolute adjectives, explaining the entailment patterns in (77).

As things stand, though, (79) places no restrictions on the upper end of an adjective’s scale, predicting that *much* should in principle be compatible with totally closed scales as well as lower closed scales. All the examples we have considered so far involve adjectives of the latter type, as shown by the fact that the relevant adjectives are unacceptable with proportional modifiers of maximality:

- (80) a. ??a completely needed expense
 b. ??a totally desired result
 c. ??an absolutely discussed issue

It is unclear to what extent *much* is compatible with adjectives with totally closed scales, however. The examples in (78) suggest that this is generally not an option, and to date, we have found very few examples which suggest that it is, though the following is ostensibly one:

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

Although the reason for this apparent gap in the data remains to be explained, it may be a kind of ‘elsewhere effect’, given that the modifier *well* is restricted to predicates with totally closed scales, as we argue in the next section. Alternatively, it may ultimately be necessary to adjust the semantics for *much* to forbid it from applying to adjectives with totally closed scales.

Before we move to our analysis of *well*, we also need to address the fact that *much* also differs from *very* in that it is more often than not infelicitous with underived adjectives, even if they satisfy the lower closed scale requirement (cf. Bolinger 1972):

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

It is unclear whether this is a purely morpho-syntactic constraint or whether it is indicative of a deeper semantic difference between derived and underived adjectives; interestingly, there is significant overlap in the few underived adjectives that permit *much* and those that permit *well*, as we discuss below. However, what is important for our purposes is that both *much* and *very* can modify derived gradable adjectives. It is in this domain, we therefore assume, that we can clearly see the effects of the purely semantic restrictions that we have argued for here: *very* requires its adjectival argument to be relative, while *much* requires it to have a lower closed scale.

There is one important exception to the generalization that *much* cannot modify lexical adjectives, however, which arguably provides further support for our analysis: comparative forms and comparative-like expressions such as *the same*, *different*, and *preferable*) are compatible with *much* independent of the relative/absolute distinction, as illustrated by the examples in (83).

- (83)
- | | | |
|----|--|------------------|
| a. | much {wetter, more open, less dirty, etc.} | minimum standard |
| | absolute | |
| b. | much {drier, more closed, less clean, etc.} | maximum standard |
| | absolute | |
| c. | much {taller, happier, less expensive, etc.} | relative |

These facts would follow directly on our analysis if (unmodified) comparative predicates were semantically actually a type of derived minimum standard absolute adjective. Intuitively, this is certainly one way to think about the meaning of a comparative: a sentence like (84) is true just in case Kim has some degree of *taller than Lee-ness*.

- (84) Kim is taller than Lee (is).

We could derive this sort of interpretation by revising the traditional analysis of comparative morphology presented above, assuming instead that a comparative predicate of the form *more/less A than ...* is of the same semantic type as a gradable adjective ($\langle d, et \rangle$), but uses a scale that is derived from that of the adjectival root and whose minimal element is the degree denoted by the comparative clause (cf. Rotstein and Winter to appear). For example, the scale used by the predicate in (84) would be just that portion of the height scale that extends from Lee's (maximal) height upwards. The truth conditions of a comparative can then be stated in exactly the same terms as those of a minimum standard absolute adjective: the subject is required to have some non-zero degree of the described property. Since the 'zero point' is the degree to which the compared object has the relevant property, this will entail having a greater degree of the property than that, giving us the entailments we want.

On this view, the degree argument of the comparative predicate — the expression that is semantically parallel to the degree argument of an unmodified, non-

comparative adjective — represents the degree to which the subject possesses the described property in excess of the compared object: it is a differential degree (see the discussion of this point above). In the case of an unmodified comparative, we may assume that this value is restricted in the same way as other minimum standard adjectives: it is required to exceed the minimum value of the scale (which corresponds to the degree denoted by the comparative clause, as described above).

For modified comparatives, however, we expect both that modifiers sensitive to minimum values, like *much*, should be acceptable; and second, that modifiers should always modify the degree of difference between the subject and the compared object. Indeed, this is the case with *much*: (85) requires the amount of height Kim has in excess of Lee to be large, but does not entail that Kim (or Lee) has a lot of height.

(85) Kim is much taller than Lee (but both are very short).

Likewise, as observed above, measure phrases in comparatives measure just the difference between the compared objects, not the absolute measurements of either. Thus *5 feet* in (86) measures the amount to which Yao's height exceeds that of Julian's, not Yao's height in general.

(86) Yao is 5 feet taller than Julian.

Demonstrating conclusively that this is the right way of analyzing comparatives, and providing a comprehensive compositional analysis along these lines, goes beyond the scope of this paper. However, the parallels between comparatives and minimum standard adjectives, and the interpretation of modifiers in comparatives suggests that this is an approach that should receive serious consideration in future work.

6.4. WELL We now turn to a rather different kind of degree modification. In contrast to the other modifiers, *well* combines felicitously with adjectives that have totally closed scales, but not with adjectives that have open scales, as illustrated by the examples in (87)-(88).¹⁶

- (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)

¹⁶Not all nonderived adjectives with totally closed scales permit modification by *well*, however, which may be due to an independent morphosyntactic preference for *well* to modify participles. Alternatively, this restriction may be due to a semantic requirement that *well* have access to an event variable in the fine-grained lexical semantics of the modified expression, as proposed below. Something similar may be going on with *much* (cf. the discussion above), though it does seem that *well* is somewhat more permissive than *much* when it comes to modification of underived adjectives; see Bolinger 1972, pp. 38ff, 44.

- (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.

In particular, we see from the acceptability of proportional modifiers that those adjectival particles that accept modification by *well*, have closed scales:

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

An important difference between *well* on the one hand and *very* and *much* on the other is that the output of *well*-modification can be the input to a full range of further degree modification:

- (90) a. Sam is more well able to cope with the situation than is his brother.
 b. They remained very/quite/only too/hardly well aware of the difficulties that might arise from their analysis.
 c. Martin Beck is very well acquainted with the facts of the case.
 d. The facts are hardly well understood.
 e. The concert was quite well publicized.

Although in many cases it may be difficult to determine whether the degree modifier or comparative has combined with just *well* or with the *well*+A constituent, comparatives show that the latter type of combination is indeed possible: (90a) entails that Sam is well able to cope, whereas (91), in which the use of a suppletive form clearly shows that the comparative combines first (and exclusively) with *well*, only entails that Sam is able to cope to some degree. (See also Bolinger 1972, p. 268ff for related comments on the difficulty of determining what degree modifiers in fact modify.)

- (91) Sam is better able to cope with the situation than is his brother.

These facts strongly indicate that *well* is not of the same syntactic or semantic category as *very* and *much*, even though its semantic effects are similar. Instead, the facts in (90) indicate that *well* denotes a function from (gradable) adjective meanings to adjective meanings. But what kind of function?

Four facts are relevant to answering this question. First, the fact that the output of *well* modification supports modification by *very* shows that the resulting complex expression must be a relative gradable predicate. Second, 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 (92), indicating that the *well*+A complex uses an open scale.

- (92) 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.

Third, as illustrated by the examples in (93), an utterance of *x is well A* presupposes that *x is A*: each of (93a)-(93c) require it to be the case that (93d) is true.

- (93)
- 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.

Finally, there is a clear semantic relation between the degree modifier use of *well* and its adverbial use, as illustrated by the examples in (94).

- (94)
- 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 propose an interpretation of *well* in terms of the meaning of the open scale, relative adjective *good*, which we assume underlies *well*. Specifically, we propose that *well* takes a closed scale adjective $G_{[0,1]}$ as input and returns a relation between an object x in the positive extension of $G_{[0,1]}$ (an object that is $G_{[0,1]}$) and a degree d such that there is an event related to $G_{[0,1]}$ with participant x , and the degree to which the event is good is at least as great as d . An initial formalization of this hypothesis is provided in (95), where G^v is an abbreviation for an event description related to $G_{[0,1]}$, which we take to be specified in $G_{[0,1]}$'s fine-grained lexical representation.

- (95) $\llbracket \text{well} \rrbracket = \lambda G_{[0,1]}. \lambda d \lambda x : x \text{ is } G. \exists e [G^v(x)(e) \wedge \text{good}(e) \succeq d]$

For example, a sentence like *Beck is well acquainted with the facts* presupposes that Beck is acquainted with the facts (and has therefore been the acquaintancee in an acquainting event), and is true if this event qualifies as good, perhaps because it was very thoroughly carried out.

Obviously, more needs to be said about the relation between *well* and the event introduced by the gradable predicate, an issue that we investigate in detail in McNally and Kennedy 2002.¹⁷ However, for the purposes of this paper, it is enough

¹⁷In that work, we develop a more articulated analysis of the semantics of *well* which shares its basic claims about meaning with the analysis presented here, but which is formalized within the Generative Lexicon framework (Pustejovsky 1995), allowing for a specific characterization of how *well* accesses an event variable introduced by its adjectival argument. In particular, we show how it is possible to capture the relationship between the manner adverb and degree modifier uses of *well* by guaranteeing in the semantics that the scale structure of an adjective phrase of the form *well+A* is inherited from the scale structure of *well* in its manner adverb use.

to observe that (95) has the desired consequence of turning a closed scale adjective into an open scale one, since the degree argument of *well*+A is a degree on the scale associated with **good** — an open scale — rather than a degree on the scale associated with the modified adjective.

In addition to deriving the facts discussed above, this aspect of (95) also makes a new 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. In fact, expressions of the form *well*+A typically have two interpretations, as pointed out in Kennedy and McNally 1999. In addition to the ‘high degree’ reading that we have been focusing on here, *well* has a ‘manner’ reading that means something like ‘in a good way’. The following titles of articles from the world wide web illustrate this apparent polysemy.

- (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. See McNally and Kennedy 2002 for an explanation of the the degree vs. manner interpretations of *well* in terms of the role played by the object in the event.

7. CONCLUSION We have argued on the basis of facts involving the acceptability and interpretation of gradable adjectives in different contexts, entailment patterns, and in particular the distribution and interpretation of degree modifiers for the linguistic relevance of two aspects of gradable adjective meaning — scale structure and the context dependence of the standard of comparison — and we have presented a semantics for the degree modifiers *very*, *much* and *well* which makes crucial use of these distinctions. In addition, we have shown that an adjective’s scale structure is not always arbitrary, but rather there are strong correlations between the structure of the scale and the nature of the standard value, between the event structure of the verb from which a participial adjective is derived and the scale structure of that adjective, and between the part structure of an adjective’s argument and the scale structure of that adjective.

This paper clearly leaves many things to be explored. One question is to what extent the orientation of the standard can be predicted in cases of adjectives not obviously related to events. In addition, there are also many more degree modifiers

which merit investigation, and it remains to generalize the semantics provided here for *much* and *well* to uses as modifiers of other syntactic categories. One of the most important issues, however, is how 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.

Of most general interest to the study of cross-categorical similarities in meaning, the facts we have analyzed here clearly reinforce the hypothesis 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 how exactly this central semantic property is encoded in lexical representations.

REFERENCES

- BARKER, CHRIS. 2002. The dynamics of vagueness. *Linguistics and Philosophy* 25.1–36.
- BARTSCH, RENATE; and THEO VENNEMANN. 1973. *Semantic structures: A study in the relation between syntax and semantics*. Frankfurt: Athäenum Verlag.
- BIERWISCH, MANFRED. 1989. The semantics of gradation. In *Dimensional adjectives*, ed. Manfred Bierwisch and Ewald Lang, 71–262. Berlin: Springer-Verlag.
- BOLINGER, DWIGHT. 1972. *Degree words*. The Hague: Mouton.
- BORER, HAGIT. 1998. Deriving passive without theta roles. In *Morphological interfaces*, ed. Stephen Lapointe et al., 60–99. Stanford, Ca.: CSLI Publications.
- CRESSWELL, M. J. 1977. The semantics of degree. In *Montague grammar*, ed. Barbara Partee, 261–292. New York: Academic Press.
- CRUSE, D. A. 1986. *Lexical semantics*. Cambridge, UK: Cambridge University Press.
- DOETJES, JENNY. 1997. Quantifiers and selection. Doctoral Dissertation, Rijksuniversiteit Leiden.
- DOWTY, DAVID R. 1991. Thematic proto-roles and argument selection. *Language* 67.547–619.
- VON FINTEL, KAI. 1994. Restrictions on quantifier domains. Doctoral Dissertation, University of Massachusetts, Amherst.
- GAZDAR, GERALD. 1981. A phrase structure syntax for comparative clauses. In *Lexical grammar*, ed. T. Hoekstra, J. van der Hulst, and M. Morgan. Oxford: Blackwell.
- GRAFF, DELIA. 2000. Shifting sands: An interest-relative theory of vagueness. *Philosophical Topics* 20.45–81.

- HAY, JEN. 1998. The non-uniformity of degree achievements. Paper presented at the 72nd Annual Meeting of the Linguistic Society of America, New York.
- HAY, JEN; CHRISTOPHER KENNEDY; and BETH LEVIN. 1999. Scale structure underlies telicity in 'degree achievements'. In *Proceedings of SALT IX*, ed. Tanya Matthews and Devon Strolovitch, 127–144. Ithaca, NY: CLC Publications.
- HEIM, IRENE. 1985. Notes on comparatives and related matters. Unpublished ms., University of Texas, Austin.
- HEIM, IRENE. 2000. Degree operators and scope. In *Proceedings of SALT X*. Ithaca, NY: CLC Publications.
- HELLAN, LARS. 1981. *Towards an integrated analysis of comparatives*. Tübingen: Narr.
- HENDRIKS, PETRA. 1995. Petra hendriks. Doctoral Dissertation, University of Groningen.
- JACKENDOFF, RAY. 1996. The proper treatment of measuring out, telicity, and perhaps even quantification in English. *Natural Language and Linguistic Theory* 14.305–354.
- KAMP, J.A.W. 1975. Two theories of adjectives. In *Formal semantics of natural language*, ed. Edward Keenan, 123–155. Cambridge: Cambridge University Press.
- KENNEDY, CHRISTOPHER. 1999a. Gradable adjectives denote measure functions, not partial functions. *Studies in the Linguistic Sciences* 29.65–80.
- KENNEDY, CHRISTOPHER. 1999b. *Projecting the adjective: The syntax and semantics of gradability and comparison*. New York: Garland. (1997 UCSC Ph.D thesis).
- KENNEDY, CHRISTOPHER. 2001. Polar opposition and the ontology of 'degrees'. *Linguistics and Philosophy* 24.33–70.
- KENNEDY, CHRISTOPHER. 2002. Comparative deletion and optimality in syntax. *Natural Language & Linguistic Theory* 20.3.553–621.
- KENNEDY, CHRISTOPHER. 2003. Towards a grammar of vagueness. Paper presented at the Princeton Semantics Workshop, May 16-17, 2003.
- KENNEDY, CHRISTOPHER; and LOUISE MCNALLY. 1999. From event structure to scale structure: Degree modification in deverbal adjectives. In *Proceedings from SALT IX*, ed. Tanya Matthews and Devon Strolovitch, 163–180. Ithaca, NY: CLC Publications.
- KLEIN, EWAN. 1980. A semantics for positive and comparative adjectives. *Linguistics and Philosophy* 4.1–45.
- KLEIN, EWAN. 1991. Comparatives. In *Semantik: Ein internationales handbuch der zeitgenössischen forschung*, ed. Arnim von Stechow and Dieter Wunderlich. Berlin: Walter de Gruyter.

- KNOWLES, JOHN. 1974. The degree adverbial. *Journal of English Linguistics* 8.21–31.
- KRIFKA, MANFRED. 1989. Nominal reference, temporal constitution and quantification in event semantics. In *Semantics and contextual expression*, ed. Renate Bartsch, Johann van Benthem, and Peter van Emde Boas, 75–115. Stanford, CA: CSLI Publications.
- KRIFKA, MANFRED. 1992. Thematic relations as links between nominal reference and temporal constitution. In *Lexical matters*, ed. Ivan Sag and Anna Szabolcsi. Stanford, CA: CSLI Publications.
- KRIFKA, MANFRED. 1998. The origins of telicity. In *Events and grammar*, ed. Susan Rothstein, 197–235. Dordrecht: Kluwer.
- LANDMAN, FRED. 1989. Groups, I. *Linguistics and Philosophy* 12.559–605.
- LASERSOHN, PETER. 1995. *Plurality, conjunction and events*. Dordrecht: Kluwer.
- LASERSOHN, PETER. 1999. Pragmatic halos. *Language* 75.522–551.
- LEHRER, ADRIENNE. 1985. Markedness and antonymy. *Journal of Linguistics* 21.397–429.
- LEWIS, DAVID K. 1979. Scorekeeping in a language game. *Journal of Philosophical Logic* 8.339–359.
- LINK, GODEHARD. 1983. The logical analysis of plurals and mass terms: A lattice theoretical approach. In *Meaning, use, and the interpretation of language*, ed. R. Bäuerle, C. Schwarze, and A. von Stechow, 302–323. Berlin: de Gruyter.
- LUDLOW, PETER. 1989. Implicit comparison classes. *Linguistics and Philosophy* 12.519–533.
- MCCONNELL-GINET, SALLY. 1973. Comparative constructions in English: A syntactic and semantic analysis. Doctoral Dissertation, University of Rochester.
- MCNALLY, LOUISE; and CHRISTOPHER KENNEDY. 2002. Degree vs. manner ‘well’: A case study in selective binding. In *Cuadernos de lingüística IX*, ed. María Jesús Arche, Antonio Fábregas, and Augusto M. Trombetta. Madrid: Instituto Universitario Ortega y Gasset. Paper presented at the Workshop on Generative Approaches to the Lexicon, May 2001.
- PARADIS, CARITA. 2001. Adjectives and boundedness. *Cognitive Linguistics* 12.47–65.
- PUSTEJOVSKY, JAMES. 1995. *The generative lexicon*. Cambridge: MIT Press.
- RAMCHAND, GILLIAN C. 1997. *Aspect and predication*. Oxford: Clarendon Press.
- ROTSTEIN, CARMEN; and YOAD WINTER. 2001. Partial adjectives vs. total adjectives: Scale structure and higher-order modification. In *Proceedings of the Amsterdam Colloquium*.
- ROTSTEIN, CARMEN; and YOAD WINTER. to appear. Total adjectives vs. partial adjectives: Scale structure and higher-order modifiers. *Natural Language Semantics*.

- RULLMANN, HOTZE. 1995. Maximality in the semantics of wh-constructions. Doctoral Dissertation, University of Massachusetts, Amherst.
- SAPIR, EDWARD. 1944. Grading: A study in semantics. *Philosophy of Science* 11.93–116.
- SCHWARZSCHILD, ROGER. 2002. The grammar of measurement. In *Proceedings of SALT XII*, ed. Brendan Jackson. Ithaca, NY: CLC Publications.
- SEUREN, PIETER A.M. 1973. The comparative. In *Generative grammar in europe*, ed. F. Kiefer and N. Ruwet. Dordrecht: Riedel.
- SEUREN, PIETER A.M. 1978. The structure and selection of positive and negative gradable adjectives. In *Papers from the Parasession on the Lexicon, Chicago Linguistics Society*, ed. W.M. Jacobsen Farkas, Donka and K.W. Todrys, 336–346. Chicago: Chicago Linguistic Society.
- STANLEY, JASON. 2000. Context and logical form. *Linguistics and Philosophy* 23.4.391–434.
- STANLEY, JASON. 2002. Nominal restriction. In *Logical form and language*, ed. G. Peters and G. Preyer, 365–368. Oxford: Oxford University Press.
- VON STECHOW, ARNIM. 1984a. Comparing semantic theories of comparison. *Journal of Semantics* 3.1–77.
- VON STECHOW, ARNIM. 1984b. My reply to cresswell's, hellan's, hoeksema's and seuren's comments. *Journal of Semantics* 3.183–199.
- TENNY, CAROL L. 1995. How motion verbs are special: The interaction of semantic and pragmatic information in aspectual verb meanings. *Pragmatics and Cognition* 3.31–73.
- TSUJIMURA, NATSUKO. 2001. Degree words and scalar structure in Japanese. *Lingua* 111.29–52.
- UNGER, PETER. 1975. *Ignorance*. Oxford: Clarendon Press.
- VANDEN WYNGAERD, GUIDO. 2001. Measuring events. *Language* 77.61–90.
- WECHSLER, STEPHEN. 2002. Title. Unpublished ms., University of Texas, Austin.
- WILLIAMSON, TIMOTHY. 1994. *Vagueness*. London: Routledge.
- YOON, YOONGEUN. 1996. Total and partial predicates and the weak and strong interpretations. *Natural Language Semantics* 4.217–236.