

The lexical semantics of *much*: conversion from intervals to degrees*

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1. Introduction

The English quantity adjective *much* is commonly used to introduce notions of measurement into expressions. In this paper, I argue for a semantics of the word *much* that explains various aspects of its distribution by positing that it makes use of a convex interval of degrees in its meaning. Throughout the paper, I focus on its degree modifier use, illustrated in (1), as a case study.

- (1) a. the much noticed phenomenon
- b. the much considered topic
- c. the much seen interview

NPs as in (1) contain attributive uses of the stative passives *noticed*, *considered*, and *seen*. Among the problems that will be addressed in this paper is the difference between (1) and the same stative passives without modification by *much*.

- (2) a. ??the noticed phenomenon
- b. ??the considered topic
- c. ??the seen interview

I argue that the contrast between (1) and (2) helps distinguish between accounts of quantity adjectives (e.g., *much*, *many*, *little*, *few*) that give them a semantics in which they are essentially vacuous elements (Corver 1997, Neeleman et al. 2004, Solt 2010, 2014, a.o.), and those in which they perform some degree-introducing function (Wellwood et al. 2012, Wellwood 2012, a.o.). Such contrasts support the latter type of account over the former, and along those lines, a denotation will be given according to which *much* converts ordinary properties into measure functions.

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Additionally, I will discuss a further contrast in the availability of interpretations that *much* allows. This contrast is illustrated in (3).

- (3) a. the much discussed novel
- b. the much read novel

Among the interpretations allowed by the description in (3a), there is one according to which it describes a novel that has been discussed for a long period of time, as well as one according to which the novel has been discussed on many events or by many people. (3b), on the other hand, allows only the latter type of interpretation. As I will argue, the use of an interval of degrees in the denotation of *much* is necessary to explain such contrasts in available readings.

Before I present the analysis, I consider some earlier proposals on the meaning of *much*. In §2, I review proposals that take it to be a semantically vacuous morpheme, present only for syntactic purposes. Such accounts do not explain semantic generalizations on its distribution without positing homophony; for example, those discussed in Kennedy and McNally (2005), which I review in §3. In §4, I present the analysis, and, in §5, I demonstrate how it accounts for these generalizations. Before concluding, I compare the current proposal with previous ones, including a similar one found in Wellwood et al. (2012) and Wellwood (2012). With respect to the latter two proposals, I argue that the current account is preferable in giving a straightforward account of contrasts like (3).

2. Vacuous *much*

Certain previous proposals on the meaning of quantity adjectives take them to be semantically vacuous elements, present to somehow license the occurrence of other degree-related elements. I review two of these proposals below.

2.1 Corver (1997)

Perhaps the most well-known proposal of this type is that found in Corver (1997). Corver builds on Bresnan (1973), who argues for a uniform analysis of degree modifiers, positing that they occur with the word *much* (sometimes covertly), but he restricts the distribution of *much* to those degree modifiers that occur with it overtly—on his account, for selectional reasons. On Corver's analysis, degree modifiers that require *much*-support are those of the category Deg, whenever these words modify non-adjectival constituents. Examples based on Corver's, involving *so*-pronominalization, are given in (4).

- (4) a. John is fond of Mary. Maybe he is too *(much) so
- b. The weather is hot in Cairo—so *(much) so that we stayed indoors all day
- c. John is wild about Madonna, but I'm not really that *(much) so

According to Corver, because *too*, *so*, and *that* are of the category Deg, they select for a complement of category Q, whose head is realized as *much* as a last-resort strategy, on a

par with *do*-support. On the other hand, when an adjective is present, it may (and must) undergo head-movement to Q, preventing *much*-support and resulting in (5).

- (5) too (*much) tall

A drawback of Corver's proposal is the double-life it posits for *much*: on one use, it is vacuous, and on another, it is semantically-contentful, i.e., when it occurs without an additional degree modifier, as in *much different*. Later proposals, however, update Corver's with a simpler account.

2.2 Neeleman et al. (2004)

One such later proposal is that in Neeleman et al. (2004), who take *much* to be semantically vacuous in all of its uses. Neeleman et al. take it to denote an identity function on adjective meanings. The difference between *much* on its use with a degree modifier and its bare form is the application of a scale-enrichment rule, which applies only to the latter as a last-resort strategy when no modifier is present. Their account therefore extends to *much* a more basic analysis of the difference between positive and modified forms of adjectives; it could therefore be recast in terms of a phonologically-null positive morpheme, as elaborated, for example, in (Kennedy 1999, 2007, a.o.).

Crucially, on the Neeleman et al. analysis, *much* is always present with degree modifiers for purely selectional reasons, which motivates the vacuous semantics they assume it has. Degree modifiers fall into two classes, according to them, depending on whether or not they require *much*-support outside of adjectival-modification uses. Examples are given in (6).

- (6) Class I degree modifiers
- a. too *(much) taller
 - b. so *(much) under scrutiny
 - c. that *(much) into syntax
- (7) Class II degree modifiers
- a. somewhat (*much) taller
 - b. a bit (*much) under scrutiny
 - c. a good deal (*much) into syntax

Class I modifiers, as in (6), require *much*-support because of their selectional properties—they select for adjectives, while those of Class II prohibit it—they are adjuncts. Neeleman et al. (2004) show that this difference correlates with various other properties of modifiers, thus reinforcing the analysis based on syntactic selection. In the end, a syntactic explanation of *much*-support appears sufficient, so that a semantic one would be redundant. In the next section, however, I discuss certain generalizations about its distribution that motivate an at-least-partially semantic account.

3. Degree-modifier *much*

Kennedy and McNally (2005) discuss several interesting semantic generalizations about the distribution of *much*, focusing on its degree-modifier use. They argue that the distribution of various degree modifiers is a function of their definedness conditions and the scale structure associated with a particular gradable adjective. In the case of *much*, they argue that it may occur with deverbal adjectives that make use of lower-closed scales like *criticized* or *praised* (8a), but not those with open scales like *surprised* or *worried* (8b), or those with fully-closed scales derived from incremental theme verbs, like *documented* or *written* (8c).

- (8) a. the much {criticized book, praised teacher}
- b. ??the much {surprised face, worried parent}
- c. ??the much {documented event, written novel}

Kennedy and McNally argue that contrasts like those in (8) should not be explained in syntactic terms: for example, all the relevant deverbal forms can in fact be diagnosed as adjectives by their ability to occur in the complement of copular verbs like *feel*, *seem*, or *become*.

- (9) a. the author felt criticized
- b. the parent seemed worried
- c. the event became well documented

Additionally, such an explanation would miss the generalization that the degree modifier is sensitive to the contrasting scale structures of the resulting deverbal adjectives. They instead propose a semantic account of the contrasts in (8), according to which *much* is restricted to adjectives with lower-closed scales. Such an analysis explains the acceptability of (8a), whose adjectives are lower-closed, while ruling out (8b), whose adjectives have open scales, while a potential explanation for the unacceptability of (8c), according to the authors, is that it is blocked by similar examples involving the degree modifier *well*.

While this account fares well with the examples above, it runs into certain empirical problems. The first one, which Kennedy and McNally themselves note, is the unacceptability of *much* with non-deverbal adjectives—even those that can be diagnosed as having lower-closed scales: **much wet*, **much dirty*, **much bumpy*. A second problem for the account is that, contrary to what (8c) shows, *much* is not blocked with all fully-closed-scale deverbal adjectives. (3b), repeated here as (10a), was an example of such an acceptable combination, as are the other examples in (10).

- (10) a. the much read novel
- b. the much copied cassette
- c. the much photographed landscape
- d. the much traversed boulevard
- e. the much performed piece

That these adjectives involve fully-closed scales can be diagnosed by their acceptability with the scale-structure-sensitive degree modifiers *slightly* and *completely*.

- (11) a. the {slightly, completely} read novel
 b. the {slightly, completely} copied cassette
 c. the {slightly, completely} photographed landscape
 d. the {slightly, completely} traversed boulevard
 e. the {slightly, completely} performed piece

Intuitively, the difference between the adjectives in (10) and those in (8c) is that the former provide descriptions of events that may be iterated with a single theme, while the latter, given a theme, describe at most one event. Formally, the difference can be cast in terms of a difference in thematic role type: the examples in (8c) involve what Krifka (1998) calls a “strictly-incremental” theme, while those in (10) do not. A strictly-incremental theme is given by a thematic relation which is one-to-one, so that any given theme is related to exactly one event satisfying the description provided by the verb (see §5.1). In the next section, I provide an analysis of *much* that is sensitive to these differences in underlying verb meaning.

4. An interval-based denotation

In order to capture the difference between the underlying event descriptions of deverbal adjectives that *much* can and cannot combine with, it is necessary for the meaning of *much* to combine with the event description itself. That is, it is not the scale structure of the resulting adjective, but the structure of the underlying property of events that causes the noted differences in acceptability. To that end, taking a Kratzerian approach to verb meaning (Kratzer 1996), I assume that the type of verbal meaning that *much* combines with is as in (12), which uses *read* as an example (*s*, the type of events).¹

$$(12) \quad \llbracket read \rrbracket = \lambda x_e. \lambda e_s. \mathbf{read}(e)(x)$$

In (13), I give a meaning for *much* that can combine with meanings like (12). In (14), I define the metalanguage term ‘LENGTH’, which denotes a function from sets of degrees (i.e., intervals) to degrees. In what follows, μ is a contextually-determined, but monotonic, measure function on events.

$$(13) \quad \llbracket much \rrbracket = \lambda P_{\langle s, t \rangle}. \lambda e_s. \text{LENGTH}(\{d_d \mid \exists e'_s [e' \leq e \ \& \ P(e') \ \& \ \mu(e') = d]\})$$

$$(14) \quad \text{LENGTH} := \{ \langle \alpha, \beta \rangle \in \mathcal{P}(\mathbf{D}_d) \times \mathbf{D}_d \mid \forall d_d, d'_d, d''_d [d \in \alpha \ \& \ d'' \in \alpha \ \& \ d < d' < d''] \rightarrow d' \in \alpha] \ \& \ \beta = \text{MAX}(\alpha) - \text{MIN}(\alpha) \ \& \ \text{MIN}(\alpha) \neq \text{MAX}(\alpha) \} \quad (\mathcal{P}(\alpha) \text{ is the powerset of } \alpha)$$

¹Although there are arguments that the thematic relation of incremental theme verbs is contributed by the theme itself (Rappaport Hovav 2008, Bochnak 2010, 2013, Kennedy 2012), I assume here that it is part of the meaning of the verb to simplify the illustration.

The proposed denotation for *much* takes properties of events—those provided by the underlying verb—and returns a measure function, i.e., a function from events to degrees. The measure function returns a degree corresponding to the length of an interval of degrees based on the property and an event: in particular, the length of an interval of degrees measuring subevents of the given event—those that also satisfy the property—by means of the function μ . Because the truth-conditional contributions of the functions μ and LENGTH might not be transparent on first glance, I elaborate on them in turn.

4.1 μ

By taking the meanings of expressions containing *much* to be based on contextually-determined measurements, I follow Schwarzschild (2002, 2006) and Wellwood et al. (2012), Wellwood (2012).² As Schwarzschild notes for uses of *much* with mass nouns (and *many*, with plurals), the type of measurement it appears to encode is ambiguous.

(15) much food

For instance, (15) provides a description of food that might be high in volume or high in weight. However, only monotonic measurements are allowed to determine the interpretation of (15), so that, for example, it is unable to describe food in virtue of it being high in temperature. The reason that temperature is ruled out, according to Schwarzschild, is that it doesn't increase monotonically on the part structure of the domain of the property denoted by the noun—in this case, portions of food. More food means higher weight and volume, but not higher temperature.

Wellwood et al. (2012) note that similar restrictions apply in the verbal domain, which (16) illustrates.

(16) Mike ran too much

The truth of (16) can depend on a measurement of Mike's running in terms of either temporal duration or linear distance, but not in terms of speed. While the first two measurements are monotonic on the part structure of running events, speed is not: more running means more time and more distance, but not higher speed.

Returning to ' μ ' in (13), I too claim that it encodes a necessarily monotonic measurement, so that the relevant interval of degrees corresponds to, e.g., degrees of temporal duration, but not degrees encoding measurements of manner, like speed or effort, etc. In this respect, my proposal for the meaning of *much* is no different from those of previous accounts that give it semantic content.

²Wellwood (2012) takes the measure function μ encoded in the meaning of *much* to be a homomorphism from individuals to degrees, in addition to being monotonic. That is, it satisfies $\mu(a \vee b) = \mu(a) + \mu(b)$, for a, b , and their individual or material join $a \vee b$. I am agnostic on this distinction, since I do not think it is relevant to any arguments for the current proposal.

4.2 The length function

(17) repeats the function LENGTH from (14) above.

$$(17) \quad \text{LENGTH} := \{ \langle \alpha, \beta \rangle \in \mathcal{P}(\mathbf{D}_d) \times \mathbf{D}_d \mid \forall d_d, d'_d, d''_d [[d \in \alpha \ \& \ d' \in \alpha \ \& \ d < d' < d''] \rightarrow d' \in \alpha] \ \& \ \beta = \text{MAX}(\alpha) - \text{MIN}(\alpha) \ \& \ \text{MIN}(\alpha) \neq \text{MAX}(\alpha) \} \quad (\mathcal{P}(\alpha) \text{ is the powerset of } \alpha)$$

The function maps intervals of degrees to a degree corresponding to their length—that is, the difference between their maximum degree and their minimum degree.³ A property of the intervals that LENGTH is defined for is their convexity. This property is meant to encode the intuition that the difference between the minimum and maximum degrees in an interval corresponds to its length only if the interval is convex, i.e., has no degrees “missing”. A final condition that LENGTH imposes on intervals of degrees in its domain is that they are not singletons, in which case the maximum degree in the interval would be equal to the minimum. This condition rules out intervals containing only one degree.

4.3 Composing the stative passive

Before demonstrating the composition of a stative passive modified by *much*, another ingredient is necessary; that is, the stativizer *-ed* responsible for turning a verb meaning into an adjectival meaning suitable for prenominal modification. This feature of the analysis, I borrow from Baglini (2012), who gives the denotation for the stativizer in (18).⁴

$$(18) \quad \llbracket -ed \rrbracket = \lambda P_{\langle e, \langle s, d \rangle \rangle} . \lambda d_d . \lambda x_e . \exists e_s [P(x)(e) = d]$$

One of Baglini’s purposes in proposing such a denotation for the stativizer is to allow it to compose with change-of-state verbs, which are analyzed in Kennedy and Levin (2008) as making use of a degree argument in their semantics, which allows them to occur with degree modifiers like *slightly* and *completely*. As Baglini notes, just those verbs which appear to provide some type of scale in their eventive uses—either change-of-state verbs or incremental theme verbs, for which the scale is derived from the part structure of the theme—form licit stative passives.⁵ For example, she notes the following contrasts.

- (19) a. the obstructed roadway
b. the cooled soup
c. the polished metal

- (20) a. ??the followed car
b. ??the killed diplomat

³One could substitute ‘supremum’ and ‘infimum’ for ‘maximum’ and ‘minimum’, respectively. I don’t address the different consequences of these choices here.

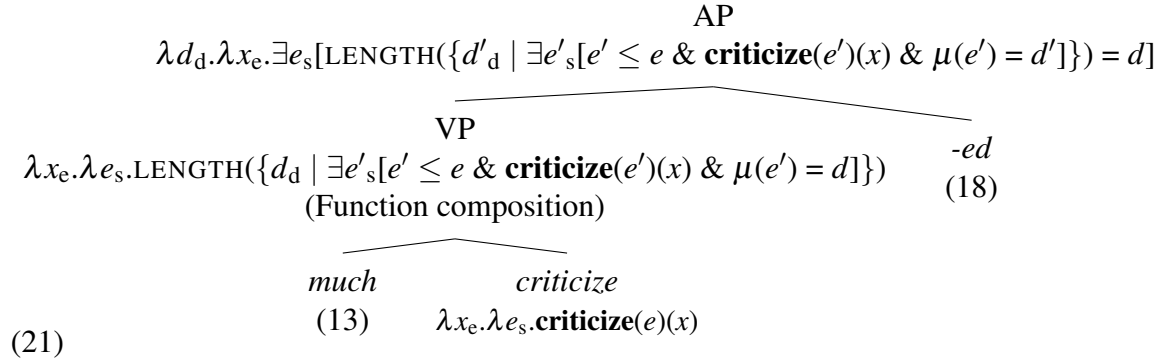
⁴Baglini restricts the first argument of the stativizer to measure-of-change functions, as introduced in Kennedy and Levin (2008). Here, I assume the stativizer composes with any meaning of the relevant type.

⁵See Koontz-Garboden (2011) for another degree-based analysis of the stativizer that builds on Kennedy and Levin (2008)’s theory of change-of-state verbs.

c. ??the considered issue

Given a degree-based semantics for the underlying verbs in (19), but not those in (20), the denotation for the stativizer in (18) is able to account for the contrast between the two sets of examples.

Now that all the ingredients for the analysis are present, I illustrate the composition of the stative passive in (1a), *much criticized*, in (21).



The result of composition in (21) is a $\langle d, \langle e, t \rangle \rangle$ -type gradable adjective meaning. Further composition with degree morphology—for example, the positive morpheme argued to be responsible for giving rise to the property meanings of bare gradable adjectives (Kennedy 1999, 2007, a.o.)—will result in the type of meaning suitable for prenominal modification.⁶

Before moving on, two things should be said about the structure in (21) and the compositional rules it invokes, respectively. The first is about the order of composition: I assume that *much* composes with the verbal meaning before it has become a stative passive, not after. In particular, this is necessary for reasons of semantic type and so that *much* has access to the relevant underlying property of events in a stative passive. A more fleshed out account of the syntax—which has to be avoided for lack of space—would regard the modifier and verbal head as a type of compound headed by the verb. The second point is related. I propose that *much* composes with the verbal head it modifies via function composition, an interperational rule often assumed to take place below the word level (see, e.g., Kratzer (2000)). If *much criticize* is a compound headed by the verb, then function composition should be allowed.

At this point, it would be worth considering the consequences of a meaning like that yielded in (21). The stative passive *much criticized*, on this account, denotes a gradable property of individuals, which, given a particular degree d , is true of individuals x for which there is an event satisfying certain properties. In particular, the event must have subevents which map to degrees via μ , yielding an interval whose length is d .⁷ Moreover, each of these subevents must be events of criticizing x . All of these properties are encoded as definedness conditions on the meaning of *much*, which returns the relevant degree d , assuming they are met.

⁶Other degree morphology is predicted to be possible, too, and it is: e.g., *a very much criticized book*.

⁷This interpretation results when \leq is chosen to be the part-of relation that holds among events (Bach 1986).

Because the only condition on μ is that it is monotonic, different interpretations should be available, as long as the definedness conditions of LENGTH are met. One monotonic measurement is temporal duration, which yields an interpretation of *much criticized* which could be paraphrased “criticized for a long time”. Another predicted reading involves cardinality, assuming there is a way of individuating criticism events. One means of individuation that yields a cardinality interpretation is the choice of μ that maps events onto the cardinalities of their agents. Such a choice of monotonic function yields an interpretation of *much criticized* which could be paraphrased “criticized by many individuals”.

For each of these interpretations, the definedness conditions of LENGTH can be met. Because LENGTH is defined on only convex intervals of degrees, it will be defined for intervals of temporal durations of criticism events: for any individual, the property of events that they are criticisms of that individual can, in principle, have divisive reference. Therefore, for any two temporal durations included in the interval, so will any intermediate temporal durations. The same convexity condition will be met for cardinality, as well. A second definedness condition imposed by LENGTH is that the intervals of degrees in its domain not be singletons. This definedness condition will be met given a construal according to which μ maps events to their temporal durations: no two ordered events, assuming one is a proper subevent of the other, will have equivalent temporal durations. Interpretations according to which μ encodes cardinality will meet this definedness condition just in case the interval contains at least two cardinalities; i.e., if, given an event, it has at least one proper subevent, with, say, a distinct agent.

5. Consequences of the proposal

In this section, I review predictions and consequences of the current proposal with reference to the data discussed in §3 and the introduction.

5.1 Strictly-incremental vs. non-strictly-incremental themes

As noted in §3, Kennedy and McNally (2005) argue for the incompatibility of *much* with incremental theme verbs like *write*. However, as I noted in that section, incremental theme verbs, like *read*, whose themes are not “strictly incremental” (in the sense of Krifka (1998)) are compatible with *much*. (22) illustrates the relevant contrast.

- (22) a. a much read book
b. ??a much written book

One particular feature of the current account predicts the contrast in (22). This feature is the definedness condition of LENGTH that it is restricted to intervals containing more than one degree. In particular, consider what the resulting denotations would be for the stative passives *much read* and ??*much written*.

- (23) a. $\lambda d_d. \lambda x_e. \exists e_s [\text{LENGTH}(\{d'_d \mid \exists e'_s [e' \leq e \ \& \ \text{read}(e')(x) \ \& \ \mu(e') = d']\}) = d]$
b. $\lambda d_d. \lambda x_e. \exists e_s [\text{LENGTH}(\{d'_d \mid \exists e'_s [e' \leq e \ \& \ \text{written}(e')(x) \ \& \ \mu(e') = d']\}) = d]$

The interval which serves as the argument to LENGTH in (23a) contains degrees mapped to by μ from subevents of an event which is a reading of x which are also readings of x . Assuming, for the moment, that μ maps events to the cardinalities of their agents, (23a) is defined. However, because the theme of a writing event is strictly incremental (there is only one such event per theme), there are no subevents of writings of x which are also writings of x . The resulting interval, therefore, has only one cardinal degree, and LENGTH is undefined.

5.2 Activities vs. accomplishments

In the introduction, a difference in interpretations was noted between stative passives involving *discuss* and those involving *read*. The relevant contrast, repeated from (3), is given in (24).

- (24) a. the much discussed novel
 b. the much read novel

While (24a) allows an interpretation according to which it describes a novel that has been discussed on many occasions or by many individuals, it also appears to allow one according to which the novel it describes has been discussed for a long period of time. A novel might be described as “much discussed”, for example, if it is discussed in a single lecture by a single person for three quarters of the time. In such a situation, “the much discussed novel” might be uttered to distinguish it from those novels the lecturer paid less attention to. (24b), on the other hand, cannot receive such an interpretation: a novel that has only been read once by a single person over the course of five years cannot be described as a much read novel, even to distinguish it from other novels read by the same person.

The difference in available readings for the two stative passives in (24) is predicted, on the current account, because of the convexity requirement on intervals imposed by LENGTH. In particular, because the property of being an event of discussing x can, in principle, have divisive reference, when μ is chosen to map events to their temporal durations, the resulting interval will be convex. Other choices for μ —for example, cardinality—will also lead to satisfaction of the convexity presupposition of LENGTH. On the other hand, if μ is chosen so as to map events to their temporal durations when the relevant property is being an event of reading x , the resulting interval will not be convex. The property of being an event of reading x , although cumulative, is not divisive; for example, while an event of reading a novel twice might last twenty hours, any proper subevent which is also a reading of the novel will be a non-infinitesimal amount shorter. It can therefore be guaranteed that the resulting interval contains some two differing temporal durations t and t' , such that $t > t'$, and lacks any t'' ordered between them. As a result, only interpretations involving cardinality are felicitous when *much* combines with incremental theme verbs like *read*.

5.3 Modified vs. unmodified stative passives

It was also noted in the introduction that certain unacceptable stative passives become fully felicitous when modified by *much*. (25) and (26) repeat the relevant contrasts.

- (25) a. ??the noticed phenomenon
b. ??the considered topic
c. ??the seen interview
- (26) a. the much noticed phenomenon
b. the much considered topic
c. the much seen interview

The current account explains the contrast between modified and unmodified forms in terms of the semantics of the resulting verbal head. The verbs in (25) and (26) cannot form stative passives on their own simply because they lack a semantics based on degree. As noted in §3, the stativizer allows only verbal meanings that have a degree argument, ruling in stative passives like *obstructed*, *cooled*, and *polished*, but ruling out those in (24). Once the verbs in (24) combine with *much*, however, the resulting form has a degree semantics suitable for being stativized. As a prediction of this account of the difference between (25) and (26), *much* should be unable to combine with verbs that already have a degree semantics. (27) (repeated from (19)) and (28) show that this prediction is verified.

- (27) a. the obstructed roadway
b. the cooled soup
c. the polished metal
- (28) a. ??the much obstructed roadway
b. ??the much cooled soup
c. ??the much polished metal

The expressions in (28) are expected to be ungrammatical once *much* combines with the verbal head. Because the meaning of *much* must combine with a property of events, verbs that already have a degree argument should resist modification.

This concludes the discussion of the current account. In the next section, I compare the approach explored here to other previous approaches, most notably that found in Wellwood et al. (2012) and Wellwood (2012).

6. A comparison of accounts

6.1 The vacuous-*much* account

Accounts according to which *much* is a semantically vacuous element that occurs only to satisfy selectional requirements of other degree modifiers run into difficulty in accounting for the data discussed in this paper. For example, consider the fact that verbs lacking a semantics based on degree combine with *much* to form felicitous stative passives. This

is true regardless of the presense of any additional degree morphology—for example, *the very much considered opinion*—so that a distinction could not be drawn between vacuous *much* and contentful *much*. An account according to which *much* serves only to satisfy selectional properties would have to reframe the distinction as a syntactic one, so that, for example, *cooled* can be adjectival, while *considered* cannot. Such a recasting of the distinction would essentially stipulate the data, however, whereas the current account relates it to independent contrasts seen in the verbal domain (Kennedy and Levin 2008). There is another point against this kind of approach, however, which is empirical: *much* contributes gradable meanings that are not available for stative passives when they occur with other degree modifiers, and vice versa. Consider the contrasts between (29) and (30), for example.

- | | | | |
|------|----|----------------------------------|--|
| (29) | a. | the much read book | (number of readers, ??number of pages) |
| | b. | the much traversed boulevard | (number of travelers, ?? number of feet) |
| | c. | the much performed piece | (number of performances, ??portion of piece) |
| (30) | a. | the slightly read book | (??number of readers, number of pages) |
| | b. | the slightly traversed boulevard | (??number of travelers, number of feet) |
| | c. | the slightly performed piece | (??number of performances, portion of piece) |

While *the much read book* can be construed as describing a book that has been read many times, it cannot be interpreted to mean the number of pages read is large. The opposite pattern is seen with *slightly*. Assuming *slightly* is a degree modifier, the interpretations in (29) must be coming from *much* itself—not the stative passive. If *much* denotes, say, an identify function on gradable properties, this result is completely unexpected.⁸

6.2 Wellwood et al. (2012) and Wellwood (2012)

Wellwood et al. (2012) and Wellwood (2012) provide a proposal about *much* very similar to the one provided here—one which is arguably much simpler. In particular, they provide *much* with the degree-based denotation in (31).

- (31) $\llbracket \text{much} \rrbracket = \lambda d_d. \lambda \alpha. \mu(\alpha) = d$ (where α ranges over, e.g., individuals and events)

On their account, *much* functions just like an ordinary gradable adjective, but the gradable property it introduces is underspecified by the measure function μ . As in the current account, μ on their proposal is required to be monotonic, introducing measurements in terms of, e.g., cardinality or weight for individuals and cardinality or temporal duration for events. However, a detailed account is not provided in their proposals of the mechanism by which measurements for plurals are restricted to cardinality. In particular, they note that a plural predicate like *more coffees* has an interpretation in terms of cardinality, but not weight or volume, while a mass NP like *more beer* can receive a weight or volume interpretation.

⁸The general compatability of *slightly* with the noted measurements can be seen by simply having it modify *more* (which is arguably a suppletive version of *much* + *-er*): *the slightly more read book* can, and in fact must, be interpreted in terms of number of readers, not number of pages. Thanks to Chris Kennedy for pointing this contrast out to me.

But the restriction on plural predicates to cardinality interpretations appears to be a puzzle, assuming that the underlying element *much* introducing the degree argument is the same. In particular, not only cardinality, but weight and volume are also monotonic on the part structure of plural individuals.

The same point can be extended to the verbal domain, where simply adding an incremental theme to a verb restricts the interpretations possible for a modifier containing *much*.

- (32) a. Sam read too much
 b. Sam read the book too much

I assume that the types of objects of which *too much* is predicated in (32) are identical. Both *read* and *read the book* describe reading events. Somehow, adding an incremental theme restricts the interpretations available for the modifier from one involving, e.g., temporal duration to a cardinality reading. It is unclear to me how this is accomplished on an account, like that represented in (31), in which the measurement introduced by *much* is not sensitive to differences in the underlying property of events.

7. Conclusion

In this paper, I have attempt to show that a degree-based semantics is necessary for the analysis of *much*. Although I focus on its degree modifier use here, *much* occurs with expressions of a range of categories, and my hope is that the analysis can extend to these other cases. Additionally, I have tried to push the point that the measurement encoded by *much* must be sensitive to the underlying property of events (and ultimately, any type of semantic object) that it modifies. The mechanism employed for accomplishing this sensitivity is one based on the notion of an interval.

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