

# Phrasal comparatives in Japanese: A measure function-based analysis

Yusuke Kubota\*

## 1 Introduction

There has recently been much discussion about the proper analysis of Japanese comparatives (cf., e.g., Beck et al. 2004; Oda 2008; Hayashishita 2009; Kawahara 2009; Kennedy 2009). Most of the discussion in the previous literature centers around the question of whether the semantics of Japanese comparatives should be modelled on the analysis of English comparatives. Beck et al. (2004) have argued against assimilating Japanese comparatives with English ones based on the observation that Japanese does not have overt comparative morphology and have proposed an analysis of Japanese comparatives in which the standard of comparison is determined contextually. Kennedy (2009) and Kawahara (2009), on the other hand, propose analyses of comparatives in Japanese in which the standard of comparison is explicitly provided by the *yori* phrase in the semantics along the lines of the *direct analysis* of comparatives (Heim, 1985).

A fully adequate analysis of comparatives should interact with other phenomena pertaining to gradable predicates such as measure phrases and degree modifiers. It turns out, however, that none of the previous analyses address this question explicitly. In this paper, I propose an analysis of phrasal comparatives in Japanese in terms of ‘*derived*’ *measure functions*, an idea informally sketched by Kennedy and McNally (2005) and more explicitly worked out by Kennedy and Levin (2008) (see also Rotstein and Winter (2003) for a similar idea). It will be shown that the proposed analysis retains the advantages of the direct analysis by Kennedy (2009) and Kawahara (2009) over Beck et al.’s (2004) original proposal regarding the basic semantic properties of phrasal comparatives in Japanese, while at the same time enabling a more straightforward analysis of cases in which comparatives interact with other phenomena.

The paper is organized as follows. Section 2 presents the relevant data to be accounted for, where it will be shown that phrasal comparatives in Japanese behave like minimum standard predicates (i.e. predicates whose meanings are determined with reference to scales with minimum endpoints) in all relevant respects. Section 3 spells out

---

\*I would like to thank Olivier Bonami, Thomas Grano, Chris Kennedy, Ai Matsui, Chris Piñón, Osamu Sawada, Yasutada Sudo and Wataru Uegaki for helpful comments and discussion. Comments by the reviewers for CSSP 2009 have also been valuable. All errors are mine. The author was supported by the Research Fellowship of the Japan Society for the Promotion of Science under Grant No. 22-2912 at the final stage of writing up this paper.

the proposal, namely, an analysis of phrasal comparatives in Japanese in terms of derived measure functions; we will see that the proposed analysis straightforwardly captures the fact that comparatives behave *like* minimum standard predicates by treating them *as* (derived) minimum standard predicates. Section 4 compares the proposed analysis with two alternatives in the previous literature: the direct analysis along the lines of Kennedy (2009) and Kawahara (2009) and the so-called ‘contextual analysis’ along the lines of Beck et al. (2004) and Oda (2008). Section 5 concludes the paper.

## 2 Data

As in English (cf., e.g., Kennedy and McNally 2005), Japanese relative (or open-scale) gradable adjectives exhibit context-dependent interpretations pervasively (contrasting sharply with absolute (or closed-scale) adjectives, whose interpretations are context-independent). The data in (1)–(3) exemplify this point. First, in the positive form (1), the standard is vague; second, as shown in (2), degree modifiers that target fixed standards are incompatible with them; and finally, as can be seen in (3), a measure phrase measures the degree against some contextually understood standard:<sup>1</sup>

- (1) Kono tana-wa takai.  
this shelf-TOP tall  
‘This shelf is tall.’
- (2) #Kono tana-wa **wazukani** takai.  
this shelf-TOP slightly tall  
intended: ‘This shelf is slightly tall.’
- (3) Kono tana-wa **20-senti-meetoru** takai.  
This shelf-TOP 20-centimeter tall  
‘This shelf is 20 centimeters taller (than some contextually salient shelf).’

Japanese is one of those languages that do not have overt comparative morphemes on adjectives. Thus, phrasal comparatives in Japanese syntactically differ from the positive form seen above only in that there is an overt *yor*i (‘than’) phrase. However, semantically (just as in English) they exhibit a sharp contrast with the positive form in that the context-dependence of relative adjectives in (1)–(3) systematically disappear. Specifically, with an overt *yor*i phrase, the bare adjective in (4) is no longer vague; degree modifiers targeting a fixed standard can occur as in (5); and finally, the measure phrase construction in (6) induces a context-independent interpretation with the standard identified by the *yor*i phrase.

- (4) Kono tana-wa **ano tana-yor**i takai.  
this shelf-TOP that shelf-than tall  
‘This shelf is taller than that shelf.’
- (5) Kono tana-wa ano tana-yor **wazukani** takai.  
this shelf-TOP that shelf-than slightly tall  
‘This shelf is slightly taller than that shelf.’

<sup>1</sup>In this respect, Japanese measure phrases differ from their counterparts in English (Kikuchi, 2002; Nakanishi, 2007).

- (6) Kono tana-wa ano tana-yori **20-senti-meetoru** takai.  
 This shelf-TOP that shelf-than 20-centimeter tall  
 ‘This shelf is 20 centimeters taller than that shelf.’

The above facts provide solid evidence that the phrasal comparative in Japanese with *yor*i phrases is a case of *explicit comparison*, with the standard of comparison explicitly provided by the *yor*i phrase, rather than a case of *implicit comparison*, contra an idea suggested by Beck et al. (2004) (see also Kennedy (2009), who arrives at the same conclusion based on a similar set of data).

### 3 A measure function-based analysis of Japanese comparatives

The data observed above suggest that when there is an overt *yor*i phrase, relative adjectives lose their context-dependent interpretations and behave like absolute adjectives in uniformly exhibiting context-independent interpretations. (See, e.g., Kennedy and McNally (2005) for the distinction between relative and absolute adjectives.) More specifically, the behaviors of comparatives are similar to those of minimum standard predicates (rather than maximum standard predicates) in that they are compatible with minimum endpoint-oriented degree modifiers such as *wazukani* ‘slightly’ and measure phrases. The relevant data of minimum standard predicates are shown in (7)–(9):<sup>2</sup>

- (7) Kono sao-wa magat-te iru.  
 this rod-TOP bent IRU  
 ‘This rod is bent.’
- (8) Kono sao-wa **wazukani** magat-te iru.  
 this rod-TOP slightly bent IRU  
 ‘This rod is slightly bent.’
- (9) Kono sao-wa **5-do** magat-te iru.  
 this rod-TOP 5-degree bent IRU  
 ‘This rod is 5 degrees bent.’

As in (7), minimum standard adjectives induce context-independent interpretations in the positive form; (8) show that they are compatible with degree modifiers such as *wazukani* ‘slightly’ that target minimum endpoints; finally, (9) shows that the interpretation of a measure phrase is not context-dependent but rather is against a fixed standard (specifically the minimum endpoint).

The measure function-based analysis that I propose below builds on the analytic intuition outlined above that there is a close parallel between comparatives and minimum standard predicates. Specifically, I take it that the essential function of the *yor*i phrase is to derive a minimum standard (absolute) predicate from a potentially open scale (relative) predicate, along the lines informally sketched in the following picture:

<sup>2</sup>For a reason that is not clear to me, most of the minimum standard predicates in Japanese are (morpho-syntactically) stative verbs of the form *X-te iru* or the so-called ‘adjectival verbs’ of the form *X-da*, rather than having the paradigmatic adjectival morphology ending in the suffix *-i* in the base form.

- (10)
- |  |                                 |
|--|---------------------------------|
| scale for <i>takai</i> ‘tall’:<br>scale for <i>ano tana-yori takai</i> ‘taller than that shelf’: | height of ‘that shelf’<br>↓<br> |
|--|---------------------------------|

The *yori* phrase takes a (potentially open-ended) scale and returns a derived *minimally closed* scale, where the minimum endpoint of this derived scale is defined by the degree that the object denoted by the *yori* phrase possesses on the original scale. In this view, comparatives behave like (lexically) minimum standard predicates because they *are* (derived) minimum standard predicates.

### 3.1 Spelling out the basic analysis

In the standard analysis of gradable adjectives, adjectives are analyzed as denoting relations between entities and degrees (of semantic type  $\langle e, \langle d, t \rangle \rangle$ ); for example, the adjective *tall* is taken to denote a relation between individuals and degrees where, for each pair of individual and degree for which the relation holds, the degree represents the height that the individual has on the scale that measures vertical length. However, in this paper I follow Kennedy (2007) in adopting a slightly different alternative analysis in which adjectives are taken to denote functions (rather than relations) of type  $\langle e, d \rangle$ , called *measure functions*, which map individuals to degrees that they possess on the relevant scale. In this setup, the adjective *tall* takes an individual  $x$  and returns a degree  $d$  which represents  $x$ 's height on the scale that measures vertical length. The choice of this alternative is not crucial for my analysis of comparatives but it has the advantage that it simplifies the formulation of certain aspects of compositional semantics. (See Kennedy (2007) for a comparison between these approaches and further references.)

In this measure function-based analysis, the semantics of the positive form of adjectives is determined by supplying the measure function denoted by the adjective as an argument to the following *pos(itive)* operator, which is a morphologically empty operator that introduces the standard of comparison and thereby converts a measure function of type  $\langle e, d \rangle$  to a predicate of individuals of type  $\langle e, t \rangle$ :

$$(11) \quad [[pos]] = \lambda g \lambda x. g(x) \geq \mathbf{stnd}(g)$$

Importantly, in the scale-based analysis of gradable predicates advocated by Kennedy and McNally (2005) and Kennedy (2007), the positive forms of gradable adjectives are given a unified analysis with this definition of the positive operator. Recall from above that relative adjectives exhibit context-dependent interpretations whereas absolute adjectives exhibit context-independent interpretations in the positive form. The crucial assumption for accounting properly for this difference in context dependence in the two kinds of adjectives is that the **stnd** function encoded in the meaning of the *pos* operator is defined in a way that is sensitive to the scale structure of the measure function that it takes as its argument: the **stnd** function returns a context-dependent vague standard for relative adjectives with open scales whereas it returns a context-independent fixed standard for absolute adjectives with closed scales. The fixed standards of absolute adjectives are determined with reference to the endpoint(s) of the scale: for maximum standard predicates such as *full*, the standard value is set to the degree corresponding to the maximum endpoint, whereas for minimum standard predicates such as *bent*, the standard is set to the degree which is

just above the minimum endpoint (relative to the degree of imprecision tolerated in the context of evaluation).<sup>3</sup>

With the definition of the *pos* operator in (11), the denotation for (1) and (7) (the positive forms of relative and absolute adjectives, respectively) end up being calculated as in (12).

- (12) a.  $[[\text{(1)}]] = \mathbf{tall}(\mathbf{this\ shelf}) \geq \mathbf{stnd}(\mathbf{tall})$   
 b.  $[[\text{(7)}]] = \mathbf{bent}(\mathbf{this\ rod}) \geq \mathbf{stnd}(\mathbf{bent})$

In both cases, the sentence asserts that the object in question has a degree on the relevant scale that is on or above the standard. Given the way in which the standard is determined for predicates having different scale structures, it follows that (12a) is true just in case the height of the shelf meets the contextually determined vague standard of tallness and that (12b) is true just in case the rod has at least some degree of bend.

In this setup, *yori* comparatives in Japanese can be analyzed as *derived* minimum standard predicates whose (derived) minimum endpoints correspond to degrees that the object denoted by the *yori* phrase possesses on the original scale. For this purpose, I employ a measure function conversion function (of type  $\langle\langle e, d \rangle, \langle e, d \rangle\rangle$ )  $\lambda g \lambda x. g^{\uparrow}_d(x)$ , mostly following the proposal by Kennedy and Levin (2008), which is a function that takes a measure function and produces out of it a derived measure function which preserves the ordering of degrees on the original scale but whose minimum endpoint corresponds to the degree  $d$  on the original scale. Assuming that degrees are modelled as real numbers between 0 and 1 and scales are sets of degrees in the  $[0, 1]$  section, (where open and closed scales are distinguished in terms of whether they include the endpoints, that is, the degrees 0 and 1), this function can be formally defined as follows:<sup>4</sup>

$$(13) \quad g^{\uparrow}_d(x) = \begin{cases} 0 & \text{if } g(x) \leq d \\ \frac{g(x) - d}{1 - d} & \text{if } d < g(x) \leq 1 \end{cases}$$

With this definition of the measure function conversion function, the meaning of *yori* can be defined as follows:

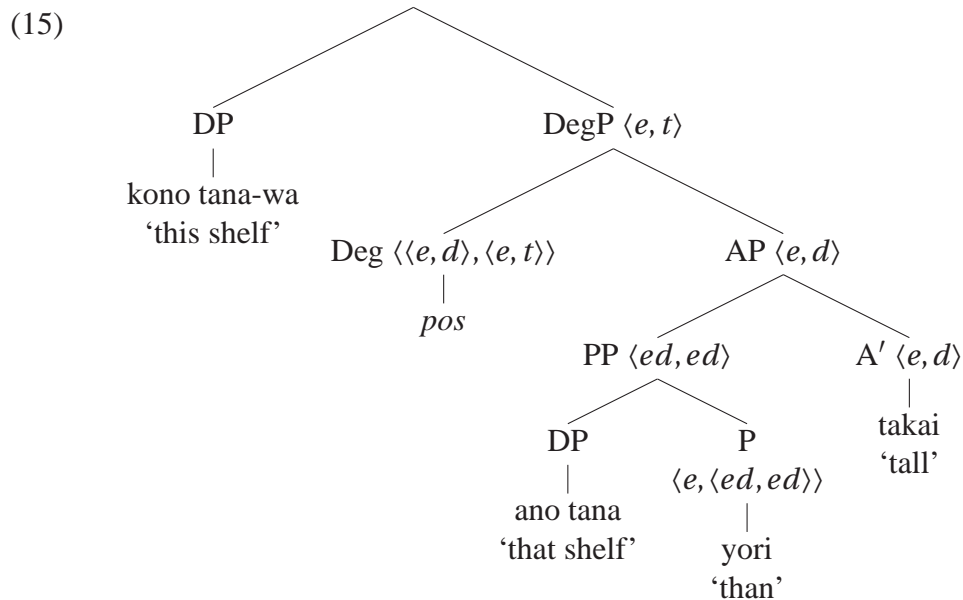
$$(14) \quad [[\text{yori}]] = \lambda y \lambda g \lambda x. g^{\uparrow}_{g(y)}(x)$$

<sup>3</sup>Intuitively, the standard is determined this way because, for any gradable predicate, the standard is that degree which defines the ‘cut off’ point for whether or not the object in question stands out on the relevant scale. See Kennedy and McNally (2005) for empirical justification for this assumption of standard setting. This pattern of standard setting is cross-linguistically justified as well (cf., e.g., Kubota (2009) and Sawada and Grano (2009) for analyses of degree modifiers and measure phrases in Japanese that crucially make use of this assumption). Kennedy (2007) seeks to explain this standard setting by means of a processing-oriented constraint which he dubs the ‘Principle of Interpretive Economy’.

<sup>4</sup>The definition of the measure function conversion function given here is slightly different from the formulation in Kennedy and Levin (2008). Kennedy and Levin (2008) simply assume that the derived measure function maps objects to degrees that are proper subsets of the degrees on the original scale, whereas my formulation involves remapping of degrees so that the derived scale is also a set of degrees from the  $[0, 1]$  section of real numbers. The reason for my choice of this implementation is that it keeps the formal structure of scales—whether they are derived or not—uniform. However, given that degrees are abstract objects that do not directly correspond to values on actual physical scales of measurement (such as meter and inch) and given that there is a one-to-one correspondence between degrees on the original scale and those on the derived scale in both formulations, I do not see any empirical difference between the two alternatives.

(14) says that *yor*i takes an entity  $y$  and an adjective  $g$  (of type  $\langle e, d \rangle$ ) as arguments and returns a measure function  $\lambda x. g^{\uparrow}_{g(y)}(x)$  of type  $\langle e, d \rangle$ . The derived measure function  $g^{\uparrow}_{g(y)}$  is a function that maps entities to a derived scale which preserves the ordering of the degrees on the scale associated with the original adjective  $g$  except that it is a minimally closed scale (which is indicated by the superscript uparrow  $\uparrow$ ) whose minimum endpoint (indicated by the subscript) corresponds to  $g(y)$  on the original scale, that is, the degree of  $g$ -ness that  $y$  possesses. Note here that this measure function is semantically of the same type as a bare adjective. Thus, an adjective modified by a *yor*i phrase can be thought of as a derived (minimum standard) adjective.

This analysis requires the *yor*i phrase to directly combine with the adjective at the level pertaining to semantic interpretation (i.e., LF, within the Heim and Kratzer-style (Heim and Kratzer, 1998) semantics). Thus, I assume the following structure for sentences containing *yor*i phrases:<sup>5</sup>



With this, the following meaning is assigned to the phrase *ano tana-yori takai* 'tall(er) than that shelf' (the AP node in the above tree):

$$(16) \quad [[\text{ano tana-yori takai}]] = [[\text{yor}i]]([[ \text{ano tana} ]]) ([[ \text{takai} ]]) \\ = \lambda y \lambda g \lambda x. [g^{\uparrow}_{g(y)}(x)](\text{that shelf})(\text{tall}) = \lambda x. \text{tall}^{\uparrow}_{\text{tall}(\text{that shelf})}(x)$$

This is a measure function of type  $\langle e, d \rangle$ , which measures the vertical height of objects in the same way as the original adjective *takai* 'tall' except that it maps everything that has an equal height as 'that shelf' or shorter to the endpoint of the scale. The denotation of the whole sentence is then calculated in the same way as the simple sentence (1) involving the positive form. Specifically, this derived measure function and the subject NP are given as arguments to the *pos* operator to yield the following logical translation for the whole sentence:

<sup>5</sup>*Yori* phrases do not necessarily appear adjacent to the adjective in the surface string (see, for example, (5) and (6)). I assume that the surface word order results from scrambling; in Japanese, the relative order among arguments and adjuncts of the main predicate is generally free and scrambling does not have any semantic effect (at least not on the basic predicate-argument relationship among the elements involved).

$$(17) \quad [[(4)]] = \text{tall}_{\text{tall}(\text{that shelf})}^{\uparrow}(\text{this shelf}) \geq \text{stnd}(\text{tall}_{\text{tall}(\text{that shelf})}^{\uparrow})$$

(17) asserts that the degree that ‘this shelf’ possesses on the derived scale of tallness (whose minimum endpoint is identified with the height of ‘that shelf’) exceeds the standard of that scale. Since the scale is minimally closed, the standard is set to that degree which is just above the minimum endpoint. Thus, the sentence correctly ends up entailing that the height of ‘this shelf’ exceeds the height of ‘that shelf’. Note in particular that the present analysis correctly predicts that (4) is false when the height of ‘this shelf’ is equal to or smaller than the height of ‘that shelf’. Given the way the derived measure function is defined (cf. (13)), all the degrees on the original scale that are equal to or smaller than the degree designating the height of ‘that shelf’ are mapped to the minimum endpoint of the scale. Crucially, since the minimum endpoint of the derived scale does not satisfy its standard (see above), all of these degrees simply make (17) false, in other words, (4) is correctly predicted to be false in all cases in which ‘this shelf’ is not taller than ‘that shelf’.

One might wonder at this point what prediction the present analysis makes when the height of ‘this shelf’ is lower than the height of ‘that shelf’ for sentences like (4). Intuitively, the sentence is false (rather than infelicitous) in such situations. This is correctly accounted for in the present analysis. Recall from above that, when a derived measure function is created out of another measure function, all degrees on the original scale below the derived zero point are mapped to the zero point on the derived scale. With this assumption, it is correctly predicted that (4) is false in the above situation.

### 3.2 Accounting for the properties of phrasal comparatives

The measure function-based analysis of phrasal comparatives spelled out above predicts that adjectives with *yor*i phrases will function exactly like lexically minimum standard adjectives. We will see below that this prediction is indeed correct. In particular, it automatically accounts for the parallels between comparatives and (lexically) minimum standard adjectives in that they both induce context-independent, fixed-standard interpretations with respect to the data considered in section 2.

#### 3.2.1 Cooccurrence with *wazukani* (‘slightly’)

First, the cooccurrence restrictions with the degree modifier *wazukani* (‘slightly’) receives an immediate account. As shown in (2) and (5), repeated here as in (18), relative adjectives become compatible with *wazukani* in the presence of a *yor*i phrase:

- (18) a. #Kono tana-wa wazukani takai.  
           this shelf-TOP slightly tall  
           intended: ‘This shelf is slightly tall.’  
       b. Kono tana-wa **ano tana-yori** wazukani takai.  
           this shelf-TOP that shelf-than slightly tall  
           ‘This shelf is slightly taller than that shelf.’

This fact follows from the proposed analysis where a relative adjective is converted to a derived, minimum standard predicate, assuming that the degree modifier *wazukani* yields

a well-defined meaning only when it combines with predicates whose scales have minimum endpoints (which is an independently motivated assumption given the distributional properties and meaning of this word):

$$(19) \quad [[\text{wazukani}]] = \lambda g \lambda x. g(x) \gtrsim \mathbf{min}(g)$$

(18a) results in infelicity since the open scale for *takai* ‘tall’ has no minimum endpoint associated with it. (18b), on the other hand, yields a perfectly coherent interpretation where it asserts that the degree that ‘this shelf’ possesses on the derived scale is slightly above the minimum endpoint of that scale, in other words, that the height difference between the two shelves is slight. This is indeed the correct meaning for (18b).

### 3.2.2 Interaction of measure phrases and *yor*i phrases

Second, the proposed analysis of phrasal comparatives interacts nicely with a simple analysis of measure phrases. I assume that the measure phrase construction involves the following null degree head which takes a gradable adjective and a degree phrase as arguments and returns a property of individuals:

$$(20) \quad [[\delta]] = \lambda g \lambda d \lambda x. g(x) - \mathbf{stnd}(g) \geq d$$

Then, (3) and (6), repeated here as in (21), are analyzed as in (22).

- (21) a. Kono tana-wa **20-senti-meetoru** takai.  
           this shelf-TOP **20-centimeter** tall  
           ‘This shelf is 20 centimeters taller (than some contextually salient shelf).’  
 b. Kono tana-wa ano tana-yori **20-senti-meetoru** takai.  
           this shelf-TOP that shelf-than **20-centimeter** tall  
           ‘This shelf is 20 centimeters taller than that shelf.’
- (22) a.  $[[\text{(21a)}]] = \mathbf{tall}(\mathbf{this\ shelf}) - \mathbf{stnd}(\mathbf{tall}) \geq \mathbf{20cm}$   
 b.  $[[\text{(21b)}]] = \mathbf{tall}_{\mathbf{tall}(\mathbf{that\ shelf})}^{\uparrow}(\mathbf{this\ shelf}) - \mathbf{stnd}(\mathbf{tall}_{\mathbf{tall}(\mathbf{that\ shelf})}^{\uparrow}) \geq \mathbf{20cm}$

The translation for (21a) in (22a) can be paraphrased as ‘this shelf is 20 cm taller than the contextually determined standard’. Thus, the context-dependent interpretation of the sentence is correctly accounted for. The translation for (21b) in (22b), on the other hand, asserts that the height difference between ‘this shelf’ and the standard of the derived scale (which is effectively identical to the height of the other shelf) is 20cm. This does not refer to any contextually determined standard and simply measures the height difference between the two shelves involved, correctly accounting for the context-independent interpretation of the comparative sentence.

A remark is in order here regarding the nature of context dependence in measure phrase constructions. In the analysis of measure phrases sketched above, the context dependence of relative adjectives with measure phrases is attributed to the same **stnd** function as is used in the definition of the *pos* operator in (11). One might find this proposal objectionable, on the grounds that the nature of context dependence in the positive form and in the measure phrase construction is somewhat different. That is, in the positive form (at least in most typical contexts; but see the discussion below), the truth conditions for the sentence is determined with reference to a vague and generic standard, whereas



sentences with measure phrases like (21a) seem to always refer to some standard that is local to the specific context of utterance (such as the height of some specific, previously mentioned shelf).<sup>6</sup> However, I think that the different nature of context dependence in the measure phrase construction and in the positive form can be explained pragmatically. The account goes roughly as follows.<sup>7</sup> Reference to a vague, generic standard is unavailable for the measure phrase construction since it is inherently incompatible with the semantic and pragmatic function of measure phrases: if the precise value of the standard is indeterminate, it simply doesn't make much sense to specify the exact amount by which the object in question exceeds that standard. I thus take it that the analysis of measure phrases given above, which encodes in itself the same **stnd** function as is used in the *pos* operator, is essentially correct.

Support for the assumption that the choice between a generic standard and a specific standard is determined by pragmatic factors rather than being directly correlated with the presence and absence of *yoru* phrases comes from the fact that the positive form in Japanese can generally refer to a specific standard as long as an appropriate context is given (Hayashishita (2009) makes the same point, using a similar example):

- (23) **A:** Kono seimitu-antenna-o                      tukuru-niwa kikkari 10 meetoru-no  
           this high.precision-antenna-ACC make-for    just    10 meter-GEN  
           doosen-ga            hituyoo-da.  
           copper.wire-NOM necessary-COP  
           ‘To make this high-precision antenna, we need a copper wire that is exactly  
           10 meters long.’
- B:** Kono doosen-wa doo-desu?  
       this copper-wire how.about  
       ‘How about this copper wire?’
- [A measures the copper wire with a high-precision ruler carefully. The length turns out to be 10 meters and 2 millimeters.]
- A:** Iya, kore-wa nagai-kara dame-da!  
       no this-TOP long-because useless-COP  
       ‘No, this one won’t work since it’s too long!’  
       (lit. ‘No, this one won’t work since it’s long!’)
- [Saying this, A throws away the copper wire in the trash bin.]

This suggests that, at least for Japanese, the **stnd** function needs to be able to refer to specific standards, as well as to vague and generic standards.

<sup>6</sup>In fact, this is what motivates Sawada and Grano (2009) to posit a degree head distinct from the one in (20) for relative adjectives with measure phrases (but without *yoru* phrases).

<sup>7</sup>The problem discussed here relates to a much larger theoretical issue of how the notion of standard (and its context-dependent nature) is to be understood and how it is affected by the truth conditional content of sentence and general pragmatic factors. My account here is admittedly sketchy and more needs to be said to fully defend it. However, expanding this discussion in full detail is beyond the scope of this paper and I will leave this task for future research.

## 4 Comparison with other approaches

As we have seen above, the proposed measure function-based analysis straightforwardly accounts for the basic properties of phrasal comparatives in Japanese. In this approach, the context dependence of relative adjectives disappears in comparatives since comparatives involve resetting of the scale: an open-scale predicate with a contextually determined standard is converted to a minimum standard predicate whose interpretation is context-independent. While this approach is intuitively natural and appealing, it is not the only option for accounting for the context-independence of the interpretations of comparatives. Specifically, there are two alternatives in the previous literature: the ‘direct’ analysis, according to which the function of the comparative phrase is simply to specify the standard of comparison without changing the scale structure (cf., e.g., Heim 1985; Kennedy 1999, 2009) and the ‘contextual’ analysis of Japanese comparatives (Beck et al., 2004; Oda, 2008), according to which the *yori* phrase does not directly make any truth-conditional contributions but the identification of the standard and the degree provided by the *yori* phrase is done by means of a purely pragmatic process.<sup>8</sup>

The question that naturally arises at this point is: are there any empirical/theoretical advantages for the proposed, measure function-based analysis over these alternatives? To answer this question, below I will compare the present analysis with these alternatives. To preview the conclusion, I will argue that the present analysis turns out to be the most uniform and simple analysis of phrasal comparatives which builds on a fully general analysis of relative and absolute predicates open-scale and closed-scale predicates and which straightforwardly accounts for cases in which comparatives interact with other phenomena pertaining to the semantics of gradable predicates (specifically, degree modifiers, measure phrases and resultatives); the main difficulty for the direct analysis comes from cases in which comparatives interact with other phenomena while the contextual analysis runs into problems in formulating a unified analysis of relative and absolute predicates in the positive and comparative forms.

### 4.1 The direct analysis

#### 4.1.1 Implementing the direct analysis

The direct analysis of comparatives can be implemented in the present setup where adjectives are taken to denote measure functions of type  $\langle e, d \rangle$  by positing the following null degree head, which combines with a gradable adjective, a *yori* phrase and a measure

---

<sup>8</sup>Yet another (also widely-entertained) approach to comparatives is one involving quantification over degrees (cf., e.g., Heim (2000)). Beck et al. (2004) point out that the kind of scope interactions with other operators that most strongly motivate the quantificational approach are not found in Japanese comparatives. I will not discuss the quantificational approach in what follows since, as far as the phenomena considered below are concerned, the quantificational approach essentially shares the same property as the direct analysis that the function of the comparative phrase is to set the standard without modifying the scale structure. Thus, it is most likely that the same kind of difficulty would arise in the quantificational analysis as in the direct analysis with respect to the data discussed in section 4.1.

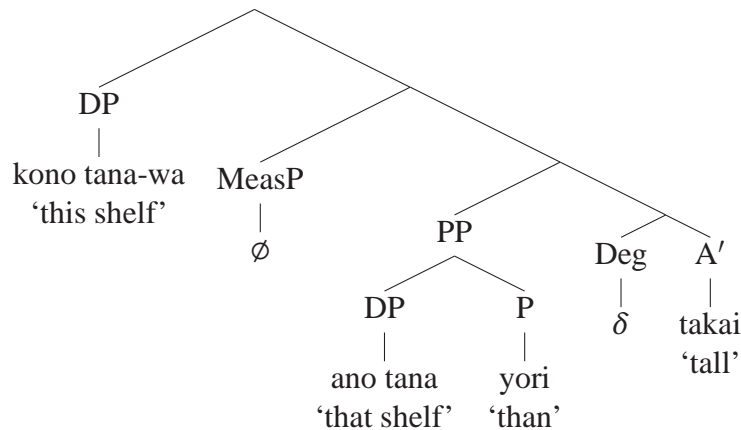
phrase (if there is one) to return a truth value:<sup>9,10</sup>

$$(24) \quad [[\delta]] = \lambda g \lambda y \lambda d \lambda x. g(x) - g(y) > d$$

With this assumption, the simple comparative sentence (4), repeated here as (25), can be analyzed as in (27), with a syntactic structure along the lines of (26) (here  $d = 0$  since there is no overt measure phrase).

- (25) Kono tana-wa **ano tana-yori** takai.  
 this shelf-TOP **that shelf-than** tall  
 ‘This shelf is taller than that shelf.’

(26)



$$(27) \quad [[(25)]] = \mathbf{tall}(\mathbf{this\ shelf}) - \mathbf{tall}(\mathbf{that\ shelf}) > 0$$

As should be clear from this exposition, the direct analysis produces the correct truth conditions for this simplest case. It should be easy to see that it produces the right result for cases involving overt measure phrases such as (6) as well.

#### 4.1.2 Compatibility with degree modifiers

The measure function-based analysis of comparatives enables a straightforward analysis of cases in which comparatives interact with degree modifiers. As shown in the following examples, two degree modifiers *wazukani* ‘slightly’ and *maamaa* ‘more or less’ in Japanese exhibit a complementary distribution in that the former is compatible with minimum standard predicates only while the latter is *incompatible* with minimum standard predicates only:

- (28) a. #Kono tana-wa **wazukani** takai.  
 this shelf-TOP slightly tall  
 intended: ‘This shelf is slightly tall.’  
 b. Kono sao-wa **wazukani** magat-te iru.  
 this rod-TOP slightly bent IRU  
 ‘This rod is slightly bent.’

<sup>9</sup>Here,  $d$  is the degree provided by the measure phrase (if there is one); I assume that, when left implicit, the value of this variable defaults to 0.

<sup>10</sup>Again, the assumption here that adjectives denote measure functions rather than relations between individuals and degrees is not crucial for the ensuing discussion. If anything, it simplifies, rather than complicates, the analysis of the relevant phenomena in the direct analysis.

- c. #Kono koppu-wa **wazukani** manpai-da.  
 this glass-TOP slightly full-COP  
 intended: ‘This glass is slightly full.’
- (29) a. Kono tana-wa **maamaa** takai.  
 this shelf-TOP more or less tall  
 ‘This shelf is more or less tall.’
- b. #Kono sao-wa **maamaa** magat-te iru.  
 this rod-TOP more or less bent IRU  
 ‘This rod is more or less bent.’
- c. Kono koppu-wa **maamaa** manpai-da.  
 This glass-TOP more or less full-COP  
 intended: ‘This glass is more or less full.’

Comparative sentences with *yori* phrases behave like minimum standard predicates in that they are compatible with *wazukani* but incompatible with *maamaa*:

- (30) Kono tana-wa ano tana-yori **wazukani** takai.  
 this shelf-TOP that shelf-than slightly tall  
 ‘This shelf is slightly taller than that shelf.’
- (31) #Kono tana-wa ano tana-yori **maamaa** takai.  
 This shelf-TOP that shelf-than more or less tall  
 intended: ‘This shelf is more or less taller than that shelf.’

This pattern is completely expected in the measure function-based analysis. We have already seen the analysis of *wazukani* in section 3.2.1. The distribution and meaning of *maamaa* can be accounted for by positing the following lexical entry for *maamaa*:

$$(32) \quad [[\text{maamaa}]] = \lambda g \lambda x. g(x) \lesssim \text{stnd}(g)$$

This says that the degree in question is slightly less than the standard, which adequately captures the meaning of this degree modifier when it occurs with relative adjectives and maximum standard predicates. Crucially, with minimum standard predicates, (32) leads to anomaly since when the standard is the minimum endpoint, nothing can have a degree that is slightly *below* that standard. Thus, in the measure function-based analysis, where the comparative form involves a minimum standard predicate, the unacceptability of (31) is accounted for in exactly the same way that the unacceptability of *maamaa* with lexically minimum standard predicate as in (29b) is accounted for.

Things are not so straightforward with the direct analysis. First of all, if scale resetting is not involved, it is not clear why attaching a *yori* phrase makes a relative adjective behave like minimum standard predicates. For the case of *wazukani*, however, one might entertain the following possibility. Instead of giving the minimum endpoint-oriented denotation along the lines of (19), one might say that *wazukani* is a measure phrase that denotes a small amount:

$$(33) \quad [[\text{wazukani}]] = d_{\text{small}}$$

This analysis will assign the following truth conditions for (30), which is equivalent to the result obtained in the measure function-based analysis spelled out in section 3.2.1:

$$(34) \quad [[(5)]] = \mathbf{tall}(\mathbf{this\ shelf}) - \mathbf{tall}(\mathbf{that\ shelf}) > d_{small}$$

Thus, by adopting this alternative analysis, the interaction between comparatives and *wazukani* can be captured adequately in the direct analysis. However, as it stands, this analysis leaves unexplained one fact: the unacceptability of *wazukani* with relative adjectives without the *yori* phrase exemplified by (28a).<sup>11</sup> (Note that the lexical entry for *wazukani* in (33) does not make reference to the minimum endpoint of the scale.)

Even if the problem with *wazukani* can be overcome along the lines sketched in footnote 11, the case of *maamaa* remains problematic. Within the direct analysis of comparatives, modelling on the analysis of *wazukani* in (33), *maamaa* might be analyzed as a measure phrase that denotes a negative small amount:

$$(35) \quad [[maamaa]] = -d_{small}$$

This accounts for the distribution of *maamaa* in (29) (that is, the non-comparative cases) in a way analogous to the measure function-based analysis in (32). However, the infelicity of *maamaa* in the comparative in (31) remains unaccounted for. That is, if scale resetting (which effectively ‘throws away’ all the degrees below the minimum endpoint) is not involved, there should be no reason why (31) cannot mean something along the lines of ‘this shelf is *almost* as tall as that shelf’ (i.e. slightly below the standard specified by the *yori* phrase).

#### 4.1.3 Measure phrases

Measure phrases can occur both with and without *yori* phrases. In particular, as can be seen in the following example repeated from above, with absolute adjectives, they induce context independent, direct measurement interpretations:

$$(36) \quad \text{Kono sao-wa } \mathbf{5\text{-do}} \quad \text{magat-te iru.}$$

this rod-TOP **5-degree** bent IRU

‘This rod is 5 degrees bent.’

The measure function-based analysis of comparatives enables a simple and straightforward analysis of measure phrases in which a single entry for the degree head defined as in (37) (= (20)) accounts uniformly for the semantic contribution of the measure phrase both in comparative and non-comparative sentences:

$$(37) \quad [[\delta]] = \lambda g \lambda d \lambda x. g(x) - \mathbf{stnd}(g) \geq d$$

<sup>11</sup>A possible explanation for this fact might come from attributing the unacceptability of such examples to pragmatic infelicity. That is, in the analysis of *wazukani* that we are considering here, what (28a) literally means is that the height of the shelf is slightly above the context-dependent vague standard. But if the precise value of the standard on the scale cannot be pinpointed, it hardly makes sense to talk about a slight difference from it. While this approach is indeed attractive, and it might ultimately turn out to be a better analysis of the meaning of expressions like *wazukani* (and ‘slightly’) than an analysis along the lines of (19) which simply stipulates that the degree expression refers to the minimum endpoint, it remains to see whether such an analysis can be defended fully against the more explicit and standardly assumed analysis (cf., e.g., Kennedy and McNally (2005) and Kennedy and Levin (2008)) along the lines of (19).

With (37), the truth conditions for (36) are calculated as follows:

$$(38) \quad \llbracket (36) \rrbracket = \mathbf{bent}(\mathbf{this\ rod}) - \mathbf{std}(\mathbf{bent}) \geq 5^\circ$$

This says that the rod is 5 degrees bent from the zero point, which is the correct result. Note crucially here that the standard function targets the minimum endpoint of the scale since the scale for **bent** is minimally closed.

We have already seen in section 3.2.2 that the degree head in (37) assigns the correct truth conditions for sentences involving a *yoru* phrase. Essentially, cases involving *yoru* phrases are just special cases of minimum standard predicates and the degree head in (37) measures the amount from the derived endpoint, which corresponds to the degree possessed by the complement of *yoru*.

Such a unified analysis of measure phrases for comparatives and non-comparatives seems difficult to achieve in the direct analysis. The degree head in (39) (= (24)) that we have introduced above in the direct analysis is for cases involving an overt *yoru* phrase (note that it explicitly subcategorizes for an individual argument *y* corresponding to the complement of *yoru*):

$$(39) \quad \llbracket \delta \rrbracket = \lambda g \lambda y \lambda d \lambda x. g(x) - g(y) > d$$

Thus, for cases without *yoru* phrases, in particular, to derive the direct measurement interpretations of absolute adjectives with measure phrases in sentences like (36), one needs an additional entry for the degree head, which, following Sawada and Grano (2009), can be defined as follows:

$$(40) \quad \llbracket \delta_{DIR} \rrbracket = \lambda g \lambda d \lambda x. g(x) \geq d \quad (\text{where } g \text{ has a well-defined endpoint})$$

It does not seem to be possible to unify the two degree heads in (39) and (40), since, in the direct analysis, the measure phrase needs to measure the degree from different points on the scale in cases involving *yoru* phrases (for which the degree is measured from the degree possessed by the complement of *yoru*) and cases that do not involve *yoru* phrases (for which the degree is measured from the standard; more specifically, in the case of minimum standard predicates, the minimum endpoint).

#### 4.1.4 Resultatives

Finally, the measure function-based analysis and the direct analysis make different predictions regarding the interactions between comparatives and the resultative construction. In Japanese, resultative sentences are formed by modifying a change of state predicate by a gradable adverbial expression, as in (41):

- (41) Ken-wa gomu-o **nagaku** nobasi-ta.  
 Ken-TOP rubber-ACC long stretch-PAST  
 lit: 'Ken stretched the rubber long.'  
 'Ken stretched the rubber and made it long.'

The resultative phrase can be comparative:

- (42) Ken-wa kono gomu-o [ano gomu-yori nagaku] nobasi-ta.  
 Ken-TOP this rubber-ACC that rubber-than long stretch-PAST  
 lit: ‘Ken stretched this rubber longer than that rubber.’  
 ‘Ken stretched this rubber and made it longer than that rubber.’

For the purpose of exploring the relevant interactions between resultatives and comparatives, I adopt a recent analysis of Japanese resultatives by Uegaki (2009) in which an explicit compositional semantics of resultatives in Japanese is worked out within the scale-based approach. Building on the measure function-based analysis of degree achievements in English by Kennedy and Levin (2008), Uegaki analyzes Japanese resultatives as verbal modifiers that change the scale structure associated with the verbal predicate. More specifically, in his analysis, a resultative phrase produced out of a gradable predicate is a verbal modifier that converts measure functions (denoted by the original verbs) into ones with *derived upper thresholds* corresponding to the standard point on the scale associated with the resultative phrase. The following picture illustrates the analysis in intuitive terms:

- (43) **stretched:**  $\begin{array}{c} \text{init}(e) \quad \text{fin}(e) \\ \cdots \bullet \quad \bullet \cdots \\ \uparrow \text{MAP} \\ \cdots \bullet \cdots \\ \text{stnd}(\text{long}) \end{array}$
- long:**  $\begin{array}{c} \cdots \bullet \cdots \\ \text{stnd}(\text{long}) \end{array}$

The resultative phrase in (41), when combined with the verbal predicate, does the following two things: (i) it maps the standard degree of length on the scale associated with the adjective *nagai* ‘long’ (i.e. the context-dependent standard for objects to count as ‘long’) to the scale of stretchedness associated with the verbal predicate along which the change of state denoted by the verb is measured and (ii) it imposes a restriction on the meaning of the whole predicate such that the sentence is made true if and only if the degree that the object in question possesses at the final stage of the relevant change of state exceeds the ‘threshold’ introduced by the resultative phrase.

Uegaki formalizes this analysis by positing the following empty adverbializer that takes a gradable predicate and turns it into a modifier of measure of change functions denoted by change of state verbal predicates:

- (44) **adv** ([[nagaku]]) =  $\lambda g \lambda x \lambda e. g(x)(e) \geq \text{MAP}_{\langle \text{long}, g \rangle}(\text{stnd}(\text{long}))$

Combining this verbal modifier with the verb *nobasi-ta* ‘stretched’, which denotes a measure of change function, the following meaning is assigned to the whole predicate:

- (45) [[nagaku nobasi-ta]] =  $\lambda x \lambda e. \text{stretched}_{\Delta}(x)(e) \geq \text{MAP}_{\langle \text{long}, \text{stretched}_{\Delta} \rangle}(\text{stnd}(\text{long}))$

Roughly speaking, (45) says that the sentence is true just in case the object in question ends up possessing a degree of stretchedness corresponding to the degree of length which, if mapped back onto the scale of length associated with the resultative phrase, exceeds the standard point of that scale. This correctly accounts for the entailment of (41) that the rubber is long after being stretched.

An interesting consequence of the measure function-based analysis of comparatives proposed above is that it interacts straightforwardly with this analysis of resultatives proposed by Uegaki (2009) to yield the correct truth conditions for sentences like (42). That

is, since the scale associated with the resultative phrase is minimally closed, its standard is the minimum endpoint corresponding to the length of ‘that rubber’. Then, (42) is predicted to be true just in case the resultant length of ‘this rubber’ exceeds that standard (i.e. the length of ‘that rubber’). Intuitively:

$$(46) \quad \begin{array}{c} \text{stretched:} \quad \text{init}(e) \quad \text{fin}(e) \\ \text{-----} \\ \quad \quad \quad \uparrow \text{MAP} \\ \text{long}^{\uparrow} \text{long}(\text{that rubber}): \quad \bullet \text{-----} \\ \quad \quad \quad \text{stnd} \\ \quad \quad \quad (\text{length of ‘that rubber’}) \end{array}$$

The denotation of the whole predicate is calculated as follows:

$$(47) \quad [[\text{ano gomu-yori nagaku nobasi-ta}] = \lambda x \lambda e. \text{stretched}_{\Delta}(x)(e) \geq \text{MAP}_{\langle \text{long}^{\uparrow} \text{long}(\text{that rubber}), \text{stretched}_{\Delta} \rangle}(\text{stnd}(\text{long}^{\uparrow} \text{long}(\text{that rubber})))$$

With (47), (42) is predicted to be true just in case the rubber ends up possessing a degree of stretchedness corresponding to a length that exceeds the length of ‘that rubber’, which is indeed the correct truth conditions for the sentence.

Now, if one instead adopts the direct analysis of comparatives, things are not so straightforward. The reason is essentially as follows. In Uegaki’s (2009) analysis, the adverbializer takes a measure function denoted by the resultative phrase and converts it to a verbal degree modifier. (This assumption is motivated by the fact that a certain *scale compatibility* requirement exists in the Japanese resultative construction between the scale associated with the resultative phrase and that associated with the verb.) This analysis of resultatives interacts smoothly with the measure function-based analysis of comparatives since, in the measure function-based analysis of comparatives, both comparatives and positive forms of gradable predicates are analyzed as denoting measure functions. However, this is not the case in the direct analysis. In the direct analysis, the function of the *yori* phrase is to supply an explicit standard value. Thus, positive forms and comparatives have different semantic types. Given this non-uniformity of semantic types of the positive form and comparatives, a unified analysis of resultatives for examples like (41) and (42) is at the very least not straightforward, in contrast to the case with the measure function-based analysis where a simple analysis that covers the positive form automatically extends to the case involving the comparative form.

To summarize the discussion in this section, we have seen that, in the three cases (i.e. interactions with degree modifiers, measure phrases and resultatives) considered above, the measure function-based analysis and the direct analysis of comparatives contrast with one another in that the former straightforwardly accounts for the relevant interactions of comparatives with the other phenomena while such is not the case with the latter.

## 4.2 The contextual analysis of comparatives

For Japanese comparatives, there is still another kind of analysis in the in the previous literature (cf. Beck et al. (2004); Oda (2008)), which claims that the *yori* phrase does not make any truth conditional contributions to the interpretations of comparative sentences and that the standard setting in Japanese comparatives is purely a pragmatic matter. Following Oda (2008), I will collectively call such approaches the ‘contextual analysis’ of



comparatives. In what follows, I will briefly summarize the most recent variant of the contextual analysis, namely, Oda's (2008) proposal, and then point out what I take to be the most problematic aspect of this kind of approach as compared to the proposed measure function-based analysis (which takes the contribution of the *yoru* phrase to have a truth conditional effect).<sup>12</sup>

Oda (2008) advocates a variant of the contextual analysis in which all adjectives in Japanese are assigned 'comparative' meanings in the lexicon. In Oda's analysis, the lexical entry for *takai* 'tall' is formulated as in (48):<sup>13</sup>

$$(48) \quad [[\text{takai}]] = \lambda x. \mathbf{tall}(x) > c$$

That is, the predicate *takai* is true of an individual  $x$  just in case the degree that  $x$  possesses on the scale of vertical length exceeds some standard whose value is specified by the free variable  $c$ . In this analysis, the vague interpretation of sentences like (1) is obtained by leaving the value of  $c$  to be determined entirely contextually so that it picks up the vague, context-dependent standard. On the other hand, in sentences like (4) with overt *yoru* phrases, the value of  $c$  is identified with the degree specified by the *yoru* phrase through some contextual mechanism. (This identification of the value of  $c$  and the degree invoked by the *yoru* phrase is crucial for the contextual analysis to yield the right predications for comparative sentences. However, neither Oda (2008) nor its precursor Beck et al. (2004) spell out fully how this pragmatic identification works and the exact details are somewhat unclear.)

This kind of analysis runs into problems when one attempts to extend it to absolute predicates. Just as in English, absolute predicates in Japanese exhibit context-independent interpretations both in the positive form and in the comparative form, as exemplified by the following examples:

- (49) a. Kono sao-wa magat-te iru.  
           this rod-TOP bent IRU  
           'This rod is bent.'
- b. Kono sao-wa ano sao-yori magat-te iru.  
           this rod-TOP that rod-than bent IRU  
           'This rod is more bent than that one.'
- (50) a. Kono ita-wa taira-da.  
           this board-TOP flat-COP  
           'This board is flat.'
- b. Kono ita-wa ano ita-yori taira-da.  
           This board-TOP that board-than flat-COP  
           'This board is more flat than that one.'

Both with the minimum standard predicate *magat-te iru* 'bent' and *taira-da* 'flat', the comparative form exhibits a differential interpretation in which the degree that the subject

<sup>12</sup>Note also that, just like the direct analysis, the contextual analysis does not involve scale resetting. Given this, the kinds of problems that I have discussed in the previous section for the direct analysis will most likely carry over to the contextual analysis as well.

<sup>13</sup>The notation is slightly adapted from the original to make it consistent with the one assumed in this paper. Nothing crucially hinges on this change of notation.

of the sentence possesses is measured against the fixed standard provided by the *yor*i phrase. However, in the positive form, absolute predicates do not exhibit differential interpretations. (49a) is true just in case the rod has at least some degree of bend and (50a) is true just in case the board is completely flat. In other words, the standard is fixed to the endpoint of the scale rather than being identified with some contextually determined vague value. This means that the template for adjective meanings given in (48), which builds in itself a comparative (or differential) meaning, cannot be used for the positive form of absolute predicates. Thus, under the contextual analysis, one will either have to say that the semantics of the positive form and the comparative form are different (at least for absolute predicates) or that the semantics of relative and absolute predicates are different (at least for the positive form).<sup>14</sup> In either case, one has to give up a uniform analysis of relative and absolute predicates in the positive and comparative forms. Given that such an analysis is straightforwardly available in the derived measure function-based analysis that I have proposed in this paper, I take it that the data with absolute predicates favor the present proposal over the contextual analysis of comparatives.

## 5 Conclusion

Despite the simplicity and intuitive appeal of the basic idea, the derived measure function-based analysis of comparatives has not gained great popularity in the literature of comparatives; so far, it has only been alluded to occasionally in relation to the analyses of other phenomena (cf., e.g., Rotstein and Winter (2003); Kennedy and McNally (2005); Kennedy and Levin (2008)). In particular, to the best of my knowledge, there has not yet been any serious attempt in the previous literature that investigates the consequences of such an analysis for any kind of comparative construction in any language. This paper has undertaken precisely that task by taking the phrasal comparative construction in Japanese as a test case and by formulating an explicit compositional semantics of this construction in terms of the measure function-based approach. As I have argued above, the main advantage of this analysis is that it fully retains the insights of the more standard, direct analysis of comparatives (in treating the Japanese comparatives with *yor*i phrases as a case of explicit comparison) while at the same time enabling a straightforward treatment of cases in which comparatives interact with other phenomena pertaining to gradable predicates. Given that the measure function-based analysis automatically yields the correct predictions in such cases which are not available in other approaches, I take these results to favor the measure function-based analysis of phrasal comparatives in Japanese over these alternatives.

Since the semantics of comparatives is a complex issue, there are many questions that are left for future study. I will list here two most important ones. First, in this paper I have focused on phrasal comparatives but Japanese also has what looks like clausal comparatives:

---

<sup>14</sup>It should be noted here that this problem is not restricted to the lexical variant of the contextual analysis by Oda (2008). As long as the meanings of comparatives are analyzed by fixing the value of a contextual variable *c* with a degree associated with the *yor*i phrase (which is the distinguishing property of the contextual analysis), a unified analysis of relative and absolute predicates is difficult.

- (51) John-wa [Mary-ga kat-ta]-yori takusan-no kasa-o kat-ta.  
 John-TOP Mary-NOM buy-PAST-than many-GEN umbrella-ACC buy-PAST  
 ‘John bought more umbrellas than Mary did.’

It remains to see whether the measure function-based analysis can be extended to clausal comparatives as well and whether there is any advantage in such an analysis over alternative analyses.

Second, even as an analysis of phrasal comparatives, the present proposal is somewhat simplified in that I have only provided explicit analyses of cases in which the *yori* phrase correlates with the subject of the sentence. However, as the ambiguity of the following sentence shows, generally, that is not the only option:

- (52) Watasi-wa Ken-yori Robin-o aisi-te iru.  
 I-TOP Ken-than Robin-ACC love IRU  
 ‘I love Robin more than Ken does.’  
 ‘I love Robin more than I love Ken.’

Matsui and Kubota (2010) propose an analysis of the ambiguity of sentences like (52) in terms of the direct analysis of comparatives, together with the technique of *parasitic scope* (Barker, 2007; Kennedy and Stanley, 2008) to get the compositional semantics right. It seems that, whether one adopts the direct analysis or the measure function-based analysis, something like parasitic scope is called for to account properly for all of the range of interpretations generally available for comparative sentences. However, working out the full details of the compositional semantics of comparatives is beyond the scope of this paper and I leave this task for future study.

## References

- Barker, Chris, 2007. Parasitic scope. *Linguistics and Philosophy*, 30:407–444.
- Beck, Sigrid, Toshiko Oda, and Koji Sugisaki, 2004. Parametric variation in the semantics of comparison: Japanese vs. English. *Journal of East Asian Linguistics*, 13:289–344.
- Hayashishita, J.-R., 2009. *Yori*-comparatives: A reply to Beck et al. (2004). *Journal of East Asian Linguistics*, 18:65–100.
- Heim, Irene, 1985. Notes on comparatives and related matters. MS, University of Texas, Austin.
- , 2000. Degree operators and scope. In Jackson, Brendan and Tanya Matthews (eds.), *Proceedings from Semantics and Linguistic Theory X*, pp. 40–64. Ithaca, New York: Cornell University.
- Heim, Irene and Angelika Kratzer, 1998. *Semantics in Generative Grammar*. Oxford: Blackwell Publishers.
- Kawahara, Koji, 2009. Phrasal comparatives and their composition. *York Papers in Linguistics*, 9:48–79.

- Kennedy, Christopher, 1999. *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. New York: Garland Press.
- , 2007. Vagueness and grammar: The semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy*, 30:1–45.
- , 2009. Modes of comparison. In *Proceedings from the Annual Meeting of the Chicago Linguistic Society*, vol. 43, pp. 141–165.
- Kennedy, Christopher and Beth Levin, 2008. Measure of change: The adjectival core of degree achievements. In Kennedy, Christopher and Louise McNally (eds.), *Adjectives and Adverbs: Syntax, Semantics and Discourse*, pp. 156–183. Oxford: Oxford University Press.
- Kennedy, Christopher and Louise McNally, 2005. Scale structure, degree modification, and the semantics of gradable predicates. *Language*, 81:345–381.
- Kennedy, Christopher and Jason Stanley, 2008. What an average semantics needs. In *Semantics and Linguistic Theory (SALT) 18*, pp. 465–482. Ithaca, NY: CLC Publications.
- Kikuchi, Akira, 2002. On the interpretation of measure phrases in English and Japanese. In S. Haraguchi, O. Fujimura and B. Palek (eds.), *Proceedings of LP 99*, pp. 971–980. Charles University in Prague: The Karilinum Press.
- Kubota, Yusuke, 2009. More on scale structure and degree modification: The case of *kanari* in Japanese. To appear in *Proceedings of Chicago Linguistic Society 45*. Chicago Linguistics Society.
- Matsui, Ai and Yusuke Kubota, 2010. Comparatives and contrastiveness: Semantics and pragmatics of Japanese *hoo* comparatives. To appear in *Proceedings of Formal Approaches to Japanese Linguistics 5*. Cambridge, MA: MITWPL.
- Nakanishi, Kimiko, 2007. *Formal Properties of Measurement Constructions*. Berlin and New York: Mouton de Gruyter.
- Oda, Toshiko, 2008. *Degree Constructions in Japanese*. Ph.D. thesis, University of Connecticut.
- Rotstein, Carmen and Yoad Winter, 2003. Total adjectives vs. partial adjectives: Scale structure and higher-order modifiers. *Natural Language Semantics*, 12:259–288.
- Sawada, Osamu and Thomas Grano, 2009. Investigating an asymmetry in the semantics of Japanese measure phrases. To appear in *Proceedings of BLS 35*.
- Uegaki, Wataru, 2009. Japanese resultative phrases as verbal degree modifiers. Paper presented at the Workshop on Scalarity and Event Structure, Chronos 9, Paris, September 2009.